See pp 13, 14 for description of projects for Hawaii, Guam, Amer Samoa

HL, SFC

A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

NATIONAL MARINE FISHERIES SERVICE

Federal Aid Program Activities

1971

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

1871

1971

A CENTURY OF

FISH CONSERVATION

U.S. DEPARTMENT OF COMMERCE
Maurice H. Stans, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Dr. Robert M. White, Administrator

NATIONAL MARINE FISHERIES SERVICE
Philip M. Roedel, Director

NATIONAL MARINE FISHERIES SERVICE

FEDERAL AID PROGRAM ACTIVITIES

1971

Prepared by

Division of Federal Aid Staff

Washington, D.C.

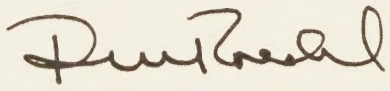
July 1971

FOREWORD

The National Marine Fisheries Service is pleased to join with the States and others in this grant-in-aid program for fisheries. Although only 6 years have passed since funds were first made available in fiscal year 1966, many significant accomplishments are readily apparent. Through the use of these funds, fisheries management in the United States has been greatly enhanced.

Fisheries management including environmental protection becomes more complex each year. At the same time, fishery products and recreational fishing are of increasing importance to the Nation. Since limited funds are available, it is imperative that work is fully coordinated and carefully selected. I hope that this report will assist in this respect. Every project since the program began is described and indexed. Also, there is a reference to publications and sources of detailed information.

I am confident this program will continue to be a productive teamwork effort with the States and the National Marine Fisheries Service as strong partners.



Director
National Marine Fisheries Service

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88-309 Law ex Center Hall 1973.

Federal Aid Program Activities

BY
DIVISION OF FEDERAL AID STAFF

INTRODUCTION

This is the fourth of a series of annual publications on project activities under the Federal Aid Program of the National Marine Fisheries Service (formerly Bureau of Commercial Fisheries). Reorganization Plan No. 4 of 1970 became effective October 3, 1970, which, among other things, abolished the Bureau of Commercial Fisheries and transferred its functions, including the direction and supervision of its Federal Aid Program, from the Department of the Interior to the Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Information presented in this report is intended to provide State program coordinators and administrators, Federal people, project personnel, and others concerned with research, development, conservation, and management of our fishery resources with a convenient reference to the National Marine Fisheries Service grant-in-aid program. This publication will also facilitate planning, coordination, and integration of State, Federal, and other activities concerned with the fishery resources.

THE ACTS

The Service's Federal Aid Program is authorized under three Acts. to 1973

1. The Commercial Fisheries Research and Development Act of 1964 (P.L. 88-309) as amended - Authorizes the Secretary of Commerce to cooperate with the 50 States, the Commonwealth of Puerto Rico, and the Governments of the Virgin Islands, Guam, and American Samoa in carrying out research and development of the Nation's commercial fisheries. Projects eligible for funding include research, development, construction, and coordination. Cost-sharing projects are funded at either a 50 percent or 75 percent level of Federal participation, whereas projects to alleviate resource disaster and for establishment of new commercial fisheries may be financed with 100 percent Federal funds. State-matching funds must be new monies not previously used for other commercial fishery research and development. This Act would have expired June 30, 1969; however, it was extended by the 90th Congress for an additional 4 years as written under Public Law 90-551.

to 1974

2. The Anadromous Fish Act of 1965 (P.L. 89-304) as amended - Authorizes the Secretary of Commerce to enter into cooperative agreements with States and other non-Federal interests for the conservation, development, and enhancement of the anadromous fishery resources of the Nation and the fish in the Great Lakes that ascend streams to spawn. The program is administered at the Federal level jointly by the National Marine Fisheries Service and the Bureau of Sport Fisheries and Wildlife. Federal funds up to 50 percent may be used to finance project costs. State fishery agencies, colleges, universities, private companies, and other non-Federal interests in 31 States bordering the oceans and the Great Lakes may participate under the Act. All projects must be approved by the State fishery agency concerned. This Act would have expired June 30, 1970; however, it was extended by the 91st Congress for an additional 4 years under Public Law 91-249. The new law establishes a ceiling of the annual amount that may be appropriated. The total of these amounts for the 4-year period is $32 million. Appropriated funds will be available to the program until expended. Also, the law provides that the Federal share of the project cost may be increased to a maximum 60 percent when two or more States, having a common interest in any basin, jointly enter into a cooperative agreement with the Secretary.

to 1973

3. The Jellyfish Act of 1966 (P.L. 89-720) as amended - Authorizes the Secretary of Commerce to cooperate with and provide assistance to the States and the Commonwealth of Puerto Rico in controlling and eliminating jellyfish and other such pests in such coastal waters. The costs of projects are funded equally by the Federal Government and by the State. State agencies responsible for the management or administration of fish and shellfish resources or water-based recreation programs may participate under the Act. This Act would have expired June 30, 1970; however, it was extended by the 91st Congress for an additional 3 years under Public Law 91-451.

DISTRIBUTION OF FEDERAL FUNDS

BY STATE

Allocation of Federal funds, excluding $1.6 million under Subsection 4(b) of the Commercial Fisheries Research and Development Act (P.L. 88-309 as amended), to the States and others by the National Marine Fisheries Service grant-in-aid program in fiscal year 1971 with cumulative totals under each public law since enactment of the legislation is given in the following table. The distribution does not reflect any reallocation of funds under P.L. 89-304 as amended and P.L. 89-720 as amended.

State and others	Fiscal Year 1971			Cumulative Total			Grand Total
	P.L.88-309	P.L.89-304	P.L.89-720	P.L.88-309	P.L.89-304	P.L.89-720	
Alabama	$ 57,400	$ 27,500	$ 0	$ 282,700	$ 80,000	$ 0	$ 362,700
Alaska	228,000	404,850	0	1,440,000	1,913,550	0	3,353,550
Arizona	19,000	0	0	120,000	0	0	120,000
Arkansas	31,400	0	0	132,400	0	0	132,400
California	228,000	285,000	0	1,440,000	1,380,000	0	2,820,000
Colorado	19,000	0	0	120,000	0	0	120,000
Connecticut	19,000	19,250	7,125	120,000	79,750	14,870	214,620
Delaware	19,000	15,000	0	147,500	65,000	0	212,500
Florida	228,000	17,500	13,800	1,440,000	70,000	63,560	1,573,560
Georgia	99,500	0	0	564,500	50,500	0	615,000
Hawaii	27,400	0	0	192,800	5,000	0	197,800
Idaho	19,000	0	0	120,000	0	0	120,000
Illinois	19,000	0	0	132,300	16,000	0	148,300
Indiana	19,000	0	0	120,000	5,000	0	125,000
Iowa	19,000	0	0	120,000	0	0	120,000
Kansas	19,000	0	0	120,000	0	0	120,000
Kentucky	19,000	0	0	120,000	0	0	120,000
Louisiana	228,000	17,500	0	1,440,000	70,000	0	1,510,000
Maine	177,600	37,500	0	1,165,000	137,000	0	1,302,000
Maryland	145,800	50,000	46,000	988,000	280,000	146,000	1,414,000
Massachusetts	228,000	20,000	0	1,440,000	93,000	0	1,533,000
Michigan	19,000	35,000	0	125,900	130,000	0	255,900
Minnesota	19,000	0	0	120,000	23,000	0	143,000
Mississippi	88,900	17,500	18,175	660,200	85,000	80,256	825,456
Missouri	22,400	0	0	123,400	0	0	123,400
Montana	19,000	0	0	120,000	0	0	120,000
Nebraska	19,000	0	0	120,000	0	0	120,000
Nevada	19,000	0	0	120,000	0	0	120,000
New Hampshire	19,000	24,000	0	120,000	79,000	0	199,000
New Jersey	114,000	17,500	0	855,800	87,500	0	943,200
New Mexico	19,000	0	0	120,000	0	0	120,000
New York	156,000	20,000	17,920	1,022,500	69,000	48,395	1,139,895
North Carolina	53,300	42,400	0	335,500	207,125	0	542,625
North Dakota	19,000	0	0	120,000	0	0	120,000
Ohio	44,100	17,500	0	310,900	80,500	0	391,400
Oklahoma	19,000	0	0	120,000	0	0	120,000
Oregon	135,200	350,000	0	765,200	1,738,025	0	2,503,225
Pennsylvania	59,500	15,000	0	330,900	57,500	0	388,400
Rhode Island	23,700	20,000	0	150,500	85,000	0	235,500
South Carolina	39,100	15,000	0	148,000	65,000	0	213,000
South Dakota	19,000	0	0	120,000	0	0	120,000
Tennessee	19,000	0	0	120,000	0	0	120,000
Texas	228,000	0	0	1,440,000	5,000	0	1,445,000
Utah	19,000	0	0	120,000	0	0	120,000
Vermont	19,000	0	0	120,000	5,000	0	125,000
Virginia	128,900	80,000	61,780	984,700	373,000	206,607	1,564,307
Washington	174,600	432,000	0	1,190,100	1,984,550	0	3,174,650
West Virginia	19,000	0	0	120,000	0	0	120,000
Wisconsin	19,100	20,000	0	120,100	83,000	0	203,100
Wyoming	19,000	0	0	120,000	0	0	120,000
American Samoa	93,100	0	0	425,500	0	0	425,500
Guam	19,000	0	0	120,000	0	0	120,000
Puerto Rico	228,000	0	10,000	1,327,600	0	32,776	1,360,376
Virgin Islands	19,000	0	0	120,000	0	0	120,000
TOTAL	$3,800,000	$2,000,000	$ 174,800	$24,000,000	$9,402,000	$ 592,464	$33,994,464

DISTRIBUTION OF FEDERAL FUNDS

BY ACTIVITY

Project activities cover various fields, including a broad catagory of research, planning, development, and construction. About 46 percent of the Federal funds is spent for research to obtain information for more effective management of the fishery resources, 18 percent for construction of research vessels and laboratories, fish hatcheries, and fish facilities, 8 percent for program planning and coordination, and 28 percent for exploratory fishing, technology, and other fishery development projects. The following table gives a distribution of Federal funds, excluding $1.6 million under Subsection 4(b) of the Commercial Fisheries Research and Development Act (P.L. 88-309 as amended), by activity under each Act.

Activity	Public Laws			Subtotal	
	Subsection 4(a) 88-309 ($1,000)	89-304 ($1,000)	89-720 ($1,000)	Dollars ($1,000)	Percent
Construction				6,115	18.0
Fish culture facilities	112				
Fish landing facilities	252				
Fish screens and stream improvement and passage facilities	21	1,172			
Hatcheries and hatchery facilities	95	2,562			
Laboratory	1,517	54			
Research vessel	330				
Coordination and planning	2,522	297		2,819	8.3
Economics	100			100	0.3
Environment improvement	283	366		649	1.9
Exploratory fishing and gear development	1,246	110		1,356	4.0
Extension service	607			607	1.8
Fish culture	1,045	15		1,060	3.1
Fish disease	988	110		1,098	3.2
Market development	2,342			2,342	6.9
Operation and maintenance	57	319		376	1.1
Research				15,766	46.4
Environment	1,315	95			
Finfish	4,891	4,270			
Jellyfish			592		
Marine worms	6,160				
Shellfish	4,443				
Statistics	826	32		858	2.5
Technology	848			848	2.5
TOTAL	24,000	9,402	592	33,994	100.0

PROJECT TITLES

All 50 States, the Commonwealth of Puerto Rico, and the Governments of American Samoa, Guam, and the Virgin Islands are participating in the program under one or more of the authorizations. Since the start of the program 621 projects have been funded at an estimated total cost (both State and Federal) of more than $72 million. Of the funded projects 386 have been completed at an estimated total cost of more than $40 million and 235 are continuing at various stages of completion at an estimated total cost of about $32 million. The following tabulation gives the number of completed and continued projects, including estimated total cost, under each Act.

Public Law	Completed Projects		Continued Projects		Total Projects	
	Number	Total Cost	Number	Total Cost	Number	Total Cost
88-309	279	$24,187,583	162	$15,825,559	441	$40,013,142
89-304	103	15,332,712	66	15,844,762	169	31,177,474
89-720	4	791,972	7	1,229,775	11	2,021,747
TOTAL	386	$40,312,267	235	$32,900,096	621	$73,212,363

A list of projects by State, including title, estimated total cost, year initiated and duration, and page reference for project narrative and publication follows:

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	ALABAMA						
88-309	2-18-R. Oyster raft production	1966	3	25,650	1968	96	125
	2-29-C. Construction of public oyster landing facilities	1966	1	13,000	1967	44	
	2-30-D. Shell planting for oyster cultch	1966	1	18,100	1967	97	
	2-31-C. Oyster rearing pond	1966	2	8,000	1968	43	
	2-34-R. Cooperative Gulf of Mexico estuarine inventory - Alabama	1966	4	208,100	1970	52	121 125 132
	2-58-D. Gulf of Mexico estuarine film	1967	2	7,900	1969	63	
	2-64-D(4b). Restoration of Alabama's supply of seed oysters	1968	1	45,000	1969	115	
	2-83-R. Survey of the live bait-shrimp industry in Alabama	1969	1	4,400	1970	71	
	2-86-R. Experiments in the culture of marine species in floating baskets	1969	4	80,000		103	
	2-102-D(4b). Restoration of Alabama's public oyster reefs damaged by Hurricane Camille	1969	1	20,000	1970	115	
	2-119-R. A survey of the benthic organisms in coastal streams and brackish waters	1970	1	12,100		67	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
						Project	Publ.
	ALABAMA (CON.)	Year	Years	Dollars	Year	Page	Page
	2-120-R. Distribution of commercial fishes and invertebrates in the tidal rivers	1970	3	42,000		89	
	2-141-R. Publication and reproduction of research reports	1971	2	20,000		63	
	2-143-R. Evaluation and planning of Alabama's marine resources research and development requirements	1971	1	7,830		52	
	2-149-R. The circulation and tidal flushing of Alabama's estuaries and the effect of shell dredging on suspended solids	1971	1	31,000		67	
89-304	AFC-1. Research on striped bass in Alabama rivers	1967	3	70,000	1970	87	
	AFC-3. Striped bass, Roccus saxatiles, production to establish commercial stocks in Alabama estuaries	1970	3	80,000		87	
	AFC-4. Factors limiting the survival and growth of early life history stage of the striped bass (Roccus saxatilis)	1970	3	54,000		87	
	AFCS-5. Construction of an anadromous fish hatchery and rearing facility	1971	2	220,000		46	
	ALASKA						
88-309	5-1-S. Coordination and planning	1966	4	137,100	1969	52	
	5-3-D. Expansion of current and development of additional commercial fisheries catch, production, and gear statistics	1966	4	43,800	1969	108	126
	5-4-R. Pink salmon forecast research	1966	4	302,825	1969	80	121 123 127
	5-5-R. Kvichak River smolt study	1966	4	130,200	1969	80	125 129
	5-6-R. Cook Inlet sockeye salmon investigations	1966	4	206,000	1969	80	119 127
	5-7-R. Investigations of factors limiting the production of introduced sockeye in lakes	1966	2	49,400	1968	81	
	5-8-R. Monitoring the effects of land use on salmon production	1966	4	73,300	1969	57	
	5-9-R. Investigation of ecological factors limiting production of the Alaska Pandalid shrimp	1966	4	122,700	1969	70	123

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
						Project	Publ.
		Year	Years	Dollars	Year	Page	Page
	ALASKA (CON.)						
	5-10-R. Dungeness crab research in Southeastern Alaska	1966	4	88,600	1969	94	
	5-11-R. Reproduction of king crab (Paralithodes camtschatica) in the Kodiak Island area	1966	4	181,300	1969	94	126
	5-12-C. King salmon headquarters architectural plans	1967	1	15,000	1967	48	
	5-13-D. Commercial feasibility of Alaskan scallop fishery	1968	1	40,000	1968	100	
	5-14-D. Southeastern and Kodiak Island, Alaska, stream catalogs	1968	1	4,000	1968	52	
	5-15-S. Coordination and planning	1969	3	108,000		52	
	5-16-D. Alaska commercial fishery statistics	1969	3	79,000		108	
	5-17-R. Pink salmon studies	1969	2	116,500	1971	81	
	5-18-R. Sockeye salmon investigations	1969	3	141,000		81	
	5-19-R. Effects of land use in salmon production	1969	1	20,800	1970	69	
	5-20-R. Pandalid shrimp studies	1969	3	165,000		100	
	5-21-R. Dungeness crab research	1969	1	22,800	1970	94	
	5-22-R. King crab study	1969	3	144,000		94	
	5-23-R. Sea scallop investigations	1969	3	99,000		100	
	5-24-R. Relationships between logging activities and salmon production	1970	2	57,600		69	
89-304	AFC-2. Sockeye salmon migration behavior and biological statistics collection, Southeastern Alaska	1967	4	202,000	1970	81	
	AFC-3. Restoration and rehabilitation of earthquake-damaged pink and chum salmon spawning areas in Prince William Sound	1967	4	342,400	1970	58	126
	AFC-4. Offshore salmon abundance index	1967	4	496,000	1970	81	
	AFC-6. Bristol Bay intermediate high-seas inshore test fishing program	1967	4	218,400	1970	81	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	ALASKA (CON.)						
	AFC-7. Arctic-Yukon-Kuskokwim River anadromous fish investigations	1967	4	322,800	1970	81	
	AFC-8. Kodiak Island sockeye salmon investigations	1967	4	423,600	1970	81	121 122
	AFC-9. Identification of red salmon stocks taken in the Cape Kumlik-Aniakchak Bay fishery (Chignik area)	1967	1	40,000	1968	82	124
	AFC-10. Copper River sockeye salmon investigations	1967	4	295,800	1970	82	
	AFC-11. Planning and coordination	1967	4	214,800	1970	53	
	AFC-12. Forecast of Kodiak Island pink salmon runs from abundance of juveniles in estuaries	1968	1	44,400	1968	82	
	AFC-13. Optimum escapement studies of Chignik sockeye salmon	1967	1	33,700	1968	82	127
	AFC-14. Pink salmon forecast research	1968	3	105,400	1970	82	129
	AFC-15. Computer simulation model of the Dixon Entrance salmon stocks	1968	2	36,000	1969	82	
	AFC-16. Escapement enumeration investigations	1968	3	132,800	1970	82	121
	AFC-17. Optimum escapement studies of Chignik sockeye salmon	1968	1	33,700	1969	82	
	AFC-20. Studies of juvenile sockeye salmon in Iliamna Lake and Lake Clark	1969	1	40,000	1970	82	
	AFC-21. Kvichak River smolt study	1969	1	58,700	1970	82	
	AFC-22. Optimum escapement studies of Chignik sockeye	1969	1	33,700	1970	82	
	AFC-24. Offshore test fishing - Southeastern Alaska	1970	1	136,000		83	
	AFC-25. Sonic assessment of salmon escapements	1970	1	10,000		83	
	AFC-26. Yukon River anadromous fish investigations	1970	3	318,000		83	
	AFC-27. Kodiak sockeye rehabilitation	1970	3	469,800		83	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
						Project	Publ.
		Year	Years	Dollars	Year	Page	Page
	ALASKA (CON.)						
	AFC-28. Alaska Peninsula pink salmon forecast	1970	3	111,300		83	
	AFC-29. Sockeye salmon studies, Southeastern Alaska	1970	1	69,600		83	
	AFC-30. Stream rehabilitation, Prince William Sound	1970	3	438,900		58	
	AFC-31. Bristol Bay test fishing program	1970	3	114,800		83	
	AFC-32. Identification and enumeration of Copper River sockeye salmon stocks	1970	3	318,000		83	
	AFC-33. Sockeye smolt enumeration study	1970	2	147,200		83	
	AFC-34. Species interrelationships in Chignik Lakes	1970	3	101,100		83	
	AFC-35. Carrying capacity of the sockeye salmon nursery areas in the Kvichak district, Bristol Bay, Alaska	1970	1	50,000		83	
	AFC-36. Coordination and planning	1970	3	130,500		53	
	ARIZONA						
88-309	6-1-R. Investigation of commercial fishery potentials in reservoirs	1966	3	28,510	1969	71	123
	6-11-R. Commercial fisheries potential of reservoirs	1969	3	71,118		71	126
	ARKANSAS						
88-309	4-12-D. Commercial fishery industry survey	1966	5	83,000	1971	53	126
	4-49-R. Rearing single and multiple species populations of catfishes in cages	1969	1	14,600	1970	103	120 130
	4-53-R. Influence of temperature and photoperiod on growth, food consumption, and food conversion efficiency on blue catfish	1969	2	28,000		72	
	4-67-D. Cage culture of fish in reservoirs	1970	1	21,420	1971	103	120
	2-133-R. Culture of trout in cages	1970	1	5,400		103	
	2-148-R. Efficacy of prophylactic treatments on caged catfish and investigations of cage construction material	1971	1	14,000		103	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
						Project	Publ.
		Year	Years	Dollars	Year	Page	Page
	CALIFORNIA						
88-309	6-3-R. Fisheries resources sea survey	1966	5	799,000		53	124
	6-4-R. Shellfish laboratory operations	1966	6	738,300		103	
	6-5-S. Coordination and planning	1966	5	177,000	1971	53	
	6-6-D. Port sampling at Crescent City	1966	4	23,644	1969	109	
	6-7-R. Food habits study of organisms of the California current system	1966	3	138,300	1970	89	
	6-8-D. California shellfish and bottomfish data analysis	1966	4	226,646	1970	109	127
	6-12-C. Shellfish laboratory - water construction and electrical power installation	1970	1	40,000	1971	43	
	6-12-D. Shellfish and bottomfish data analysis	1970	3	255,000		109	
	6-16-R. Food habits of albacore, bluefin tuna, and bonito in California waters	1971	1	5,000		63	
89-304	AFSC-1. Mad River hatchery construction	1967	4	2,700,000	1971	96	
	AFC-3. Mad River hatchery fish ladder construction	1967	2	40,000	1971	46	
	AFC-6. Scott Valley fish screen construction	1967	1	70,000	1967	44	
	AFC-7. Eel and Mad River anadromous fish water requirement	1967	2	147,000	1968	69	
	AFC-8. Delta migration study	1967	1	72,000	1968	84	
	AFC-9. Banta-Carbona fish screen construction	1968	3	225,000	1971	44	
	AFSC-10. Glenn-Colusa fish screen construction	1968	4	2,540,000		44	
	AFC-11. El Solyo fish screen	1970	1	90,000	1971	44	
	COLORADO						
88-309	6-2-D. Raising bait fishes in the Rocky Mountain States	1966	5	178,000	1970	71	121 130 131
	6-11-D. Culture of fishes with commercial importance	1970	3	87,000		103	131

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	CONNECTICUT						
88-309	3-33-S. Coordination and planning	1966	3	7,100	1968	53	
	3-44-R. Investigations on the lobster	1966	4	99,836	1970	95	
	3-45-R. Investigations of the life histories and potential fishery of river herrings	1966	3	42,100	1968	77	120 125 132
	3-51-D (4b). Disaster relief, Connecticut oyster fishery	1966	1	200,000	1967	115	
	3-130-R. Ecology, population structure, and movements of lobster	1970	3	74,400		95	
89-304	AFC-1. A study of the rate and pattern of shad migration in the Connecticut River--utilizing sonic tracking apparatus	1968	3	43,000	1970	78	
	AFC-3. Investigation of the life histories and potential fishery or river herrings in Connecticut	1968	3	43,000	1970	77	
	AFC-6. A study of the migratory behavior of American shad	1970	3	66,000		78	
	AFC-7. Estimating the number of river herring in the Connecticut River	1970	3	53,200		77	
89-720	JF-3-6. Studies directed toward methods for control of *Codium fragile* in Long Island Sound	1970	3	50,400		90	
	DELAWARE						
88-309	3-8-D. Rehabilitation of the natural seed oyster beds in Delaware	1965	1	40,000	1966	97	
	3-49-R. Pilot studies of the spawning and rearing of MSX-resistant oysters	1967	3	127,800	1970	106	123
	3-49-R (4b). Pilot studies of the spawning and rearing of MSX-resistant oysters	1966	1	28,500	1967	115	
	3-55-R. A resurvey of the condition and extent of the natural seed oyster beds in Delaware	1967	1	12,000	1968	53	125
	3-98-D. An experimental planting of seed oysters in Delaware Bay	1969	1	3,600	1969	97	
	3-135-R. Hard clam survey of Delaware Bay	1970	3	60,000		92	

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	DELAWARE (CON.)						
	3-142-R. Live oyster bed and cultch survey of Delaware Bay and tributaries	1971	3	54,000		97	
89-304	AFCS-1. Feasibility of the restoration of shad runs in the tributaries of the Delaware estuary	1967	1	20,000	1968	78	
	AFSC-3. Shad passageway construction on the Brandywine River	1968	4	480,000		44	
	AFSC-4. Restoration of shad runs in the Brandywine Creek and its tributaries	1971	6	907,250		44	
	FLORIDA						
88-309	2-11-D. Marketing of seafoods	1965	4	1,389,557	1970	65	123
	2-50-D. Gulf of Mexico estuarine film	1967	2	7,900	1969	63	
	2-52-D. Construction of artificial oyster reefs	1967	4	194,384	1971	97	
	2-53-R. A study of the effects of a commercial hydraulic clam dredge on benthic communities in estuarine areas	1967	3	99,000	1970	58	129
	2-81-R (4b). Cooperative crab study - South Atlantic States	1969	1	15,000	1970	115	125
	2-113-R. Development of specialized mariculture techniques on species of high potential	1970	3	90,000		104	
	2-125-D. Fisheries marketing and extension service	1970	1	226,524		65	
	2-126-D. Fisheries technical assistance	1970	1	52,000		63	
	2-134-R. Exploratory clam survey of estuarine and nearshore waters	1970	3	322,000		92	
89-304	AFC-2. Investigations on the American shad in the St. Johns River	1968	3	72,240	1971	78	
	AFCS-5. Study of anadromous fishes of Florida	1971	3	228,000		89	
89-720	JF-2-2. Survey of the distribution and abundance of the Portuguese Man-O-War in waters adjacent to Florida	1969	3	165,520		90	

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	GEORGIA						
88-309	2-10-R. Feasibility study of methods for improving oyster production in Georgia	1965	4	120,900	1968	97	124
	2-32-R. Preliminary survey of existing and potential marine resources on the Georgia coast	1966	1	3,600	1966	89	
	2-35-C. Research vessel construction	1966	2	50,860	1968	40	
	2-43-R. Seasonal abundance and biological stability of the commercial shrimp of Georgia	1966	3	104,805	1969	100	119 122
	2-44-R. Survey of a potential hard clam fishery	1966	2	44,080	1968	92	122 131
	2-46-R. Economic survey of the marine commercial fishery industry in Georgia	1966	2	25,000	1968	57	119 120 127
	2-68-R. Exploratory study of the commercial marine resources of the Georgia coast	1968	2	85,504	1970	61	
	2-74-S. Coordination of P.L. 88-309 program	1968	2	34,000	1970	53	
	2-82-R (4b). Cooperative blue crab study - South Atlantic States	1969	1	25,000	1970	115	125
	2-84-R. A study of the nutritional, physiological, and economic requirements for the production of channel catfish in an intensive running water culture	1969	3	105,000	1971	104	118
	2-87-R. Preliminary studies of a potential finfish industry from commercial shrimp landings	1969	2	40,000	1971	100	
	2-115-S. Coordination of P.L. 88-309	1970	3	79,500		53	
	2-116-R. Studies on the ecology of Georgia's estuarine waters	1970	3	359,640		68	
	2-117-R. Catfish fingerling production under intensive running water conditions.	1970	1	10,000		104	
89-304	AFC-1. Shad fishery of the Altamaha River	1967	1	29,940	1968	78	122
	AFC-6. A study of the nursery areas and biology of juvenile anadromous fishes of the Altamaha River, Georgia	1968	2	61,000	1970	77	118

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	HAWAII						
88-309	H-1-D. Development of a prawn fishery	1966	2	88,379	1969	104	122
	H-2-R. Investigation for the development of a commercial oyster industry	1966	2	34,611	1969	98	128
	H-3-R. Central Pacific Tuna Conference	1966	1	4,000	1966	53	
	H-4-R. Management investigation of the akule or jack mackerel (Trachurops crumenophthalmus)	1966	3	25,878	1969	80	128
	H-5-R. Management investigations of two species of spiny lobster, Panulirus japonicus and P. penicullatus	1966	3	10,144	1969	95	
	H-6-R. Management and development investigations of the Kona crab (Ranina serrata)	1966	3	20,434	1969	94	
	H-9-R. Publication of Central Pacific Tuna Conference proceeding and background	1966	1	5,000	1966	53	125
	H-10-R. Handling baitfish in Hawaii	1966	3	26,000	1969	71	
	H-13-D. Commercial oyster fishery development investigations	1969	3	65,800		97	
	H-14-D. Development of a prawn culture industry	1969	3	135,375		104	
	IDAHO						
88-309	1-1-D. Experimental rearing of steelhead trout at Hayden Creek ponds	1966	3	62,688	1970	87	
	1-9-C. Construction of Hayden Creek rearing ponds	1966	2	65,324	1969	46	
	1-51-C. Construction of Hayden Creek rearing ponds	1969	3	30,200		46	
	1-57-D. Test rearing of anadromous fish, Lemhi River drainage	1970	4	89,300		104	
	ILLINOIS						
88-309	4-13-R. Clam industry in Illinois	1966	2	16,300	1968	92	
	4-32-R. Feeding-out catfish in cages	1967	2	31,793	1969	104	124

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	ILLINOIS (CON.)						
	4-33-R. Investigations of problems associated with the confinement of warmwater fishes in holding tanks	1967	2	31,300	1969	104	
	4-35-D. Consumer education and market development	1967	2	21,200	1970	63	
	4-36-R. Physiological and behavioral relationships among species of fishes	1968	2	22,470	1970	75	
	4-50-R. Significance of ionic content of water in determining the growth and handling quality of channel catfish	1969	3	51,120		72	
	4-51-R. Considerations in the commercial production of channel catfish	1969	2	25,380	1971	105	
89-304	AFC-2. Histology of the thyroid and pituitary glands in the alewife	1970	2	33,000		77	
	INDIANA						
88-309	4-10-R. Mussel research study	1966	2	31,960	1968	96	
	4-16-R. Inland waters commercial fisheries studies	1966	2	20,900	1968	109	
	4-43-R. Inter-species relationships of fish in Indiana waters of Lake Michigan	1968	3	36,000	1971	84	
	3-150-R. Interspecies relationships of fish in Indiana waters of Lake Michigan	1971	3	75,600		75	
	IOWA						
88-309	4-11-R. Industrial and commercial food fish investigations	1966	6	161,000		75	125 126
	KANSAS						
88-309	4-1-R. Investigations on digestion and metabolism of channel catfish	1965	3	82,860	1968	72	121,129 130,132 133,134
	4-45-R. Investigations on nutrition and metabolism of catfish and utilization of fisheries products	1969	3	84,000		72	124,130 131,132
	KENTUCKY						
88-309	4-19-R. Mussel fishery investigations	1966	3	52,300	1969	96	131 132
	4-27-R. Catfish fishery investigations	1967	2	28,000	1968	72	

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	KENTUCKY (CON.)						
	4-48-R. Influences of the effluent from a concentrated industrial complex on a large river	1969	3	60,000	1971	58	
	4-70-R. Kentucky Lake commercial catfish catch analysis	1970	2	10,000		72	
	LOUISIANA						
88-309	2-20-S. Coordination and planning	1965	4	33,950	1970	53	
	2-21-R. Coastwide study of penaeid shrimp	1965	1	124,840	1966	100	
	2-22-R. Ecology of Louisiana's estuarine waters	1966	5	833,134	1970	68	118
	2-23-D. Oyster lease control monuments	1966	4	301,338	1970	97	124
	2-24-D. Shell planting for oyster cultch	1966	1	25,000	1966	97	122
	2-27-D (4b). Rehabilitation and restoration of oyster seed grounds	1966	1	100,000	1966	115	
	2-54-D. Shell planting for oyster cultch	1967	1	105,000	1967	98	
	2-57-D. Gulf of Mexico estuarine film	1967	2	7,900	1969	63	
	2-63-C. Construction of saltwater culture ponds	1968	1	92,935	1969	43	
	2-72-R. Evaluation of experimental oyster tonging reefs in Calcasieu Lake	1969	2	45,000		98	
	2-90-R. Experiments to reestablish historical oyster seed grounds and to control the Southern oyster drill	1969	3	102,000		98	
	2-91-R. A study of the clam, Rangia cuneata, in Lake Pontchartrain and Lake Maurepas	1969	3	107,000		92	130
	2-92-R. A study of the blue crab fishery in Louisiana	1969	3	97,000		95	
	2-93-R. Investigations of commercially important penaeid shrimp in Louisiana estuaries	1969	3	170,000		102	
	2-94-R. A study of commercially important estuarine dependent industrial fishes	1969	3	86,000		89	

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	LOUISIANA (CON.)						
	2-101-D (4b). Rehabilitation of natural oyster seed grounds destroyed or damaged by Hurricane Camille	1969	1	176,388	1970	119	
	2-114-D. Clam shell planting for oyster cultch	1970	1	200,000		98	
	2-118-D. Control monuments for oyster losses	1970	3	280,000		98	
	2-130-S. Coordination	1970	3	75,000		54	
89-304	AFSC-1. Ecological factors affecting anadromous fishes of Lake Pontchartrain and its tributaries	1967	3	128,000	1970	68	
	MAINE						
88-309	3-12-R. Northern shrimp - biological and technological research	1966	3	134,196	1970	102	118
	3-13-D. Maine marine fisheries extension service	1966	6	170,000		63	
	3-14-R. Lobster research program	1966	5	309,600	1971	95	
	3-15-R. The development of commercial fisheries estuarine resources	1966	4	81,914	1970	89	
	3-16-R. Biological, environmental, and technological research on marine worms	1965	6	234,000		80	
	3-17-D. Study of the economic and operational feasibility of mechanization of the Maine sardine-processing canning operations	1965	2	95,000	1967	111	
	3-18-R. Investigation of physical aspects of raw herring	1966	1	7,247	1966	111	
	3-24-D. Promotion and market development	1966	3	194,028	1970	65	125
	3-70-S. Coordination of research and development	1967	2	87,000	1970	54	
	3-72-C. Laboratory and tank room construction	1967	1	4,000	1968	48	
	3-83-C. Marine research laboratory construction	1969	1	124,000	1970	48	
	3-94-D. Testing and adapting existing sardine-processing equipment	1969	1	8,000	1969	111	

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	MAINE (CON.)						
	3-115-D. Market development	1970	3	131,100		65	
	3-117-R. Northern shrimp - assessment of some population parameters	1970	3	96,000		102	
	3-123-S. Coordination of research and development projects	1970	3	108,000		54	
	FWAC -1. Statewide comprehensive fish and wildlife management plan	1968	1	5,703	1969	54	
	FWAC-2. Statewide comprehensive fish, wildlife, and marine management plan	1969	2	42,413		54	
89-304	AFC-2. Increased development of the commercial anadromous fishery resources	1967	2	48,000	1969	77	
	AFC-6. Stream improvement and fishway construction	1968	3	100,000		45	
	AFCS-9. Phase II, Marine research laboratory construction	1970	1	200,000		48	
	AFSC-11. Statewide comprehensive wildlife management plan	1968	1	2,852	1969	54	
	AFSC-13. Statewide comprehen- fish, wildlife, and marine management plan	1969	2	42,412		54	
	AFC-14. Development and management of alewife, blueback, and shad resources	1969	4	125,000		77	
	AFC-15. Fishway construction and stream improvement	1971	3	180,000		45	
	MARYLAND						
88-309	3-20-R. Development of a disease-resistant oyster brood stock	1967	1	19,500	1968	106	119
	3-20-R (4b). Development of a disease-resistant oyster brood stock	1965	2	46,500	1967	115	
	3-21-R. Determination of the distribution and abundance of the winter flounder	1966	2	26,672	1967	79	
	3-23-R. Study of the effects of thermal pollution on oysters in the Patuxent River estuary	1966	2	17,488	1967	69	123

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	MARYLAND (CON.)						
	3-26-R. Studies of the physical and chemical properties of the estuarine environment associated with fish kills	1966	1	21,000	1967	68	
	3-27-R. Tagging of juvenile striped bass in Chesapeake Bay estuaries	1966	2	36,595	1968	88	127
	3-29-R. Studies of the physical processes of movement and dispersion of oyster larvae	1966	1	18,000	1967	98	
	3-30-R. Suspended sediments in Chesapeake Bay	1966	3	81,206	1969	58	128
	3-42-D. An economic study of the fisheries and seafood processing industries with emphasis on the Chesapeake Bay area	1966	3	41,100	1969	57	129
	3-56-R. Biologic and environmental control of Eurasian milfoil (Myriophyllum spicatum L.) in Chesapeake Bay	1967	3	39,965	1970	70	118 122
	3-65-S. Coordination and planning	1967	3	56,000	1970	54	
	3-66-D. Market development for Chesapeake Bay seafoods	1967	3	493,800	1971	65	
	3-71-D. Maryland marine fisheries extension service	1967	3	57,800	1970	64	121
	3-75-R. Development of disease-resistant oysters (C. virginica) under field conditions in lower Chesapeake Bay	1967	3	97,500	1971	107	120
	3-81-D. Pasteurization of crabmeat through the use of radio frequency waves	1968	1	41,900	1969	111	
	3-86-D. Oyster shucking study	1968	2	61,000	1970	111	
	3-91-R (4b). Blue crab study in Chesapeake Bay, Maryland	1968	1	25,000	1969	115	
	3-93-R. The effects of the Maryland hydraulic clam dredge on populations of the soft shell clam	1969	3	60,000		68	
	3-108-R. Blue crab study in Chesapeake Bay	1969	3	240,000		95	
	3-126-D. Seafood extension service	1970	3	75,000		64	

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	MARYLAND (CON.)						
	3-129-D. Oyster processing study	1970	1	40,726		111	
	3-131-R. Molluscan mortality studies	1970	3	107,210		107	
	3-132-D. Maryland seafood marketing	1970	3	369,340		65	
	3-144-D. National molluscan film	1970	2	8,000		64	
89-304	AFSC-1. Ecological study of Susquehanna River and tributaries below Conowingo Dam and their contribution to anadromous fish populations of Upper Chesapeake Bay	1967	3	228,300	1970	69	120
	AFC-3. Stream improvement program for anadromous fish management	1967	3	218,272	1970	58	127
	AFC-4. Suspended sediments in Chesapeake Bay	1969	1	45,000	1970	58	
	AFC-5. Suspended sediments in Chesapeake Bay	1970	1	85,000		58	
	AFC-6. Coordination service	1970	3	42,000		54	
	AFC-8. Survey of anadromous fish spawning areas	1970	3	423,700		75	
89-720	JF-3-1. A study of the biology of sea nettles to develop potential methods for control of their abundance	1968	2	200,000	1970	91	119
	JF-3-7. A study of the biology of sea nettles to develop potential methods for control of their abundance	1970	3	370,000		91	129
	MASSACHUSETTS						
88-309	3-35-R. Marine food science and technology research on sanitation and handling for purpose of improving product quality and shelf-life of Massachusetts commercial fishery products	1967	3	155,913	1970	111	120 124 127
	3-37-D. Collection, compilation, evaluation, and dissemination of commercial fisheries statistics	1966	7	164,999		109	118 119 127
	3-38-R. Identification of winter flounder subpopulations	1966	2	32,000	1969	79	

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	MASSACHUSETTS (CON.)						
	3-39-C. Cat Cove dike	1966	1	30,000	1967	43	
	3-40-S. Coordination and planning	1966	4	129,904	1970	54	
	3-50-D. Consumer education and market development	1966	2	480,000	1970	66	125
	3-52-C. Cat Cove pier and pool	1966	2	54,000	1968	43	
	3-60-D. Shellfish technical assistance	1969	5	107,000		64	
	3-73-R. Study of the feasibility and application of Danish seining to the Massachusetts fishing industry	1967	1	45,000	1968	61	
	3-74-C. Marine research laboratory construction	1967	4	400,000		48	
	3-76-C. Marine research vessel acquisition	1967	2	40,000	1969	50	
	3-87-R. Winter flounder investigations	1969	4	100,000		79	
	3-107-R (4b). Disaster relief: Massachusetts haddock fishery	1969	1	200,000	1970	117	
	3-109-D. Massachusetts commercial fisheries extension service	1969	4	200,000		64	
	3-134-S. Coordination	1970	3	118,000		54	
	3-136-D. Massachusetts fisheries marketing program	1970	3	299,199		66	
89-304	AFC-1. Anadromous fish investigations	1967	4	80,000	1970	45	
	AFCS-9. Anadromous fisheries development	1970	4	180,000		45	
	MICHIGAN						
88-309	4-2-R. Surveillance of lake trout restoration in Michigan waters of Lake Michigan	1966	4	129,044	1969	74	131 133 134
	4-59-R. Lake trout restoration studies	1969	3	143,000		74	
	4-63-D (4b). Whirling disease control	1969	1	65,000	1970	115	

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	MICHIGAN (CON.)						
89-304	AFC-1. Appraisal of stocks of anadromous fishes in the Michigan waters of the Great Lakes	1967	1	35,350	1967	75	
	AFC-7. Parasites, disease, and disease control of Great Lakes anadromous and commercial fish	1968	3	213,187	1970	107	
	AFSC-8. Great Lakes fish resource development study	1968	1	120,000	1971	54	
	AFC-9. Parasites and diseases of anadromous and commercial fish	1970	3	271,368		107	
	MINNESOTA						
88-309	4-8-R. Minnesota commercial fisheries improvement - Western Lake Superior	1965	4	52,216	1969	73	123 130
	4-22-D. Development of under-ice horizontal sonar scanning equipment and technique for locating fish schools	1966	3	15,300	1969	61	129
	4-38-R. Lake Superior commercial fisheries assessment studies	1968	3	37,750	1971	74	
	4-39-R. Minnesota commercial fisheries improvement - Lake of the Woods	1968	4	105,978		76	
	4-44-R. A physiological study of thermal stress in channel catfish	1968	2	13,500	1970	72	
	3-143-R. Factors determining the relationships of the burbot to other associated species in Minnesota waters	1971	3	41,639		76	
89-304	AFC-2. Anadromous fish habitat development	1967	1	16,000	1968	58	
	MISSISSIPPI						
88-309	2-25-R. Cooperative Gulf of Mexico estuarine inventory study, Mississippi	1966	4	396,000	1970	55	120,121 131,133
	2-28-R. A study of coliform bacteria and E. coli on polluted and unpolluted oyster bottoms of Mississippi and a study of depuration by rebedding	1966	3	111,500	1969	107	120
	2-42-R. A seasonal study of nektonic and benthic faunas of the shallow gulf off Mississippi out to the fifty-fathom curve	1966	3	113,800	1969	70	120,130 133,134

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	MISSISSIPPI (CON.)						
	2-59-D. Gulf of Mexico estuarine film	1967	2	7,900	1969	63	
	2-61-R. A study of bacterial spoilage in iced Penaeus shrimp	1967	3	57,100	1970	112	
	2-85-R. A study of the parasites and diseases of fish, mollusk, and crustacea utilized in mariculture	1969	3	120,000		107	127
	2-103-D (4b). Rehabilitation and restoration of oyster grounds damaged by the hurricane of August 17, 1969	1969	1	85,000	1970	117	
	2-111-R. Coordination and planning, fisheries resources research and development, Mississippi	1970	1	30,000	1970	55	
	2-123-R. A study of the blue crab fishery in Mississippi	1970	3	94,500		96	
	2-124-R. Investigation of commercially important penaeid shrimp in Mississippi estuaries	1970	3	110,000		102	
	2-128-R. Investigations of coastal pelagic fishes	1970	3	93,000		89	
89-304	AFCS-1. A study of the striped bass in Mississippi waters	1967	4	195,000	1970	88	127
	AFCS-2. Anadromous fish laboratory construction	1969	1	50,000	1970	49	
	AFCS-4. Establishment of a commercial and sport striped bass fishery in coastal streams, estuaries, and open Gulf of Mexico waters	1970	3	210,000		88	
89-720	JF-2-1. Population studies of coelenterates with special emphasis on noxious planktonic forms	1967	4	164,162	1971	91	122 127
	JF-2-8. Population studies of noxious coelenterates of Mississippi Sound	1971	3	119,050		91	
	MISSOURI						
88-309	4-3-R. Research and management of commercial fisheries	1966	6	170,000		109	
	4-34-D. Palatability of Missouri fish	1967	1	15,200	1969	112	118 124
	4-66-R. Studies on the transmission of Plistophora ovariae, an ovary parasite of the golden shiner	1970	2	4,800		107	

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	MISSOURI (CON.)						
	2-131-D. Equipping fish disease laboratory	1970	1	6,000		107	
	MONTANA						
88-309	1-19-D. Fort Peck Reservoir fishery investigations	1966	4	101,334	1970	76	
	1-20-C. Construction of fishery research vessel for Fort Peck Reservoir fishery investigations	1966	1	20,000	1967	50	
	1-45-R. An economic study of marketing Montana commercial fisheries products	1967	2	20,400	1969	87	118
	1-56-D. Commercial fishery of Fort Peck Reservoir	1970	3	75,900		76	
	NEBRASKA						
88-309	4-4-R. Establishment of the seasonal distribution and availability of commercial fish species in the waters of Nebraska	1967	2	55,334	1969	76	125
	4-17-D. Design and construction of facilities relative to trapping and handling of commercial species	1966	1	54,000	1967	43	
	4-57-R. Commercial fishery investigations	1969	3	73,000		76	125
	NEVADA						
88-309	6-9-D. Rearing bait fishes in the desert southwest	1968	4	107,778		71	
	NEW HAMPSHIRE						
88-309	3-31-R. Soft-shell clam population study in Hampton-Seabrook Harbor, New Hampshire	1966	3	12,000	1969	92	118
	3-32-R. An investigation of the possibility of seed oyster production in Great South Bay, New Hampshire	1966	3	74,767	1969	98	118
	3-105-R. A comparative study of conventional and experimental inshore lobster gear	1969	2	40,650	1971	61	
	3-122-D. Acquisition of marine workboat	1970	1	20,000		50	
	3-146-D. National molluscan film	1971	1	4,000		64	
89-304	AFC-1. Commercial fisheries development	1968	3	230,000		45	

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	NEW JERSEY						
88-309	3-1-D. Shell planting program Maurice Cove (Delaware Bay) and Mullica River	1965	5	757,640	1970	98	
	3-2-R. Evaluation of the menhaden and shad fishery in Delaware Bay and adjacent waters	1966	2	38,002	1968	89	
	3-3-R. Disease-resistant oyster program - Delaware Bay	1967	5	150,000		98	123 125 126
	3-3-R (4b). Disease-resistant oyster program - Delaware Bay	1965	2	75,000	1967	115	
	3-78-R. Inventory of major estuarine systems	1968	2	162,300	1970	55	
	3-114-R. A study of the basic food chain relationship in coastal salt marsh ecosystems	1969	2	21,313	1971	68	
	3-120-D. Shell planting program	1970	3	300,000		99	
	3-137-R. Inventory of major estuarine systems	1970	4	259,000		70	
	3-145-D. National molluscan film	1971	1	8,000		64	
89-304	AFCS-1. Population and migration study of major anadromous fish	1967	1	59,500	1968	79	
	NEW MEXICO						
88-309	6-11-R. Investigation of commercial fishery potential of rough fish species	1968	4	58,000		72	131 132 133
	6-20-R. Vertical raceways and water re-use as a means of maximizing commercial trout production	1971	2	57,500		105	
	NEW YORK						
88-309	3-9-D. Management planning for New York freshwater commercial fisheries	1966	3	120,000	1970	55	
	3-10-C. Construction of a marine research and development laboratory	1966	3	383,000	1969	49	
	3-11-D. Pilot plant depuration of hard clams	1965	1	39,000	1966	92	
	3-63-R. Pond culture of oyster seed in a controlled natural environment	1967	5	206,320		105	

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	NEW YORK (CON.)						
	3-68-D. Studies of problems involved when hard clams in commercial quantities are subjected to the depuration process	1967	2	101,000	1968	92	
	3-84-S. Coordination and planning	1968	4	77,638		55	
	3-95-D. Operation and maintenance of marine laboratory	1969	3	107,000		66	
	3-100-R. A study of burrow selection by the American lobster	1970	3	28,000		96	
	3-101-R. A study of bay scallop growth during fall, winter, and spring in heated salt water	1970	2	32,000		105	
	3-104-C. Design and construction of shellfish survey vessel	1970	2	175,000		52	
	3-116-D. Shellfish sanitation control	1970	3	68,500		103	
	3-119-R. Development of New York State's freshwater commercial fisheries	1970	1	24,000	1970	55	
	3-139-D. Coordinated commercial fishery statistics program for the State of New York	1971	3	105,000		109	
	3-154-D. National molluscan film	1971	1	10,000		64	
89-304	AFC-4. Evaluation of present and potential sturgeon fisheries of the St. Lawrence and adjacent waters	1968	2	80,000	1970	88	
	AFC-6. Abundance, growth, distribution, and marketability rates of sturgeon (Acipenser) in coastal waters and in the Hudson River	1970	4	213,000		88	
89-720	JF-3-3. A study of the overwintering germinating stages of floating marine algae in Great South Bay, New York	1967	4	50,250	1971	91	
	JF-3-5. A study of the setting, attachment, and growth of Codium fragile on shellfish in Long Island waters	1969	3	88,000		91	

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	NORTH CAROLINA						
88-309	2-6-R. Oyster studies	1965	3	77,300	1969	99	125
	2-8-R. A study of the quality of North Carolina scallops	1965	3	37,500	1968	112	130
	2-9-R. Studies on macroplankton crustaceans and ichthyoplankton of the Pamlico Sound complex	1965	2	20,683	1967	68	
	2-26-R. Shrimp studies	1966	3	102,994	1969	102	125
	2-51-C. Equipping exploratory fishing vessel	1967	1	25,000	1968	52	
	2-73-C. Equipping exploratory fishing vessel to increase research capabilities	1968	1	16,000	1969	52	
	2-76-R. Studies on the effects of processing on the quality of seafood products	1968	1	16,700	1969	112	130
	2-80-R (4b). Cooperative blue crab study - South Atlantic States	1969	1	10,000	1970	115	125
	2-95-R. Scrap fish studies	1969	3	135,000		112	
	2-100-R. The investigation of methods for improving and evaluating the quality of seafood products	1969	3	50,100		112	
	2-129-R. Studies of commercial penaeid shrimps	1970	2	68,000		102	
	2-139-R. Plan for fisheries resources research and development, North Carolina	1971	1	18,000		55	
89-304	AFC-1. The status, abundance, and exploitation of striped bass in the Roanoke River and Albamarle Sound, North Carolina, and the spawning of striped bass in the Tar River, North Carolina	1967	3	60,000	1970	88	
	AFC-4. Factors affecting survival of immature striped bass	1968	3	39,504	1970	88	132
	AFC-5. Offshore anadromous fish exploratory fishing program	1968	4	285,344		61	
	NORTH DAKOTA						
	4-15-R. Garrison reservoir commercial fishery investigation	1966	4	30,000	1970	73	131 132 133
	4-20-D. Commercial fish market for North Dakota fisheries	1966	2	10,000	1968	57	119

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	NORTH DAKOTA (CON.)						
	4-23-D. A survey of commercial fisheries on the mainstem reservoir of the Upper Missouri River system	1966	1	4,500	1967	76	131
	4-30-R. A study of the commercial fishery potential of Lake Ashtabula	1967	3	18,300	1969	73	133
	4-54-R. Investigations of gonadatrophins in stimulating spawning in white suckers	1969	2	3,500	1971	74	133
	4-55-R. A determination of nutrient exchanges and biological nutrient removal from Lake Ashtabula	1969	3	43,500		69	
	4-69-R. Lake Sakakawea commercial fishery investigations	1970	3	25,500		73	
	4-71-R. Cage culture of black bullheads	1970	2	7,000		105	
	OHIO						
88-309	4-6-R. Lake Erie commercial fisheries research	1966	4	53,462	1969	73	128
	4-26-R. Value of whole fish meal in breeding gestation ration for swine	1967	3	85,500	1969	112	
	4-28-R. Mussel fisheries investigations	1967	3	114,500	1970	96	
	4-47-R. The status of whirling disease in Ohio waters	1969	1	16,000	1970	107	
	4-56-R. Fisheries investigations - Lake Erie	1969	3	60,000		73	
	4-64-D. Ohio's live bait industry - its extent, condition, and problems	1969	2	15,750	1971	57	
	4-65-R. Effect of whole fish meal on reproductive performance of swine	1970	2	50,000		112	
	4-68-R. Detection of *Myxosoma cerebrailis* spores in holding facilities for trout	1970	3	45,000		105	
89-304	AFCS-1. A study of the physical characteristics of the major reef areas in the Western Basin of Lake Erie	1967	3	118,000	1970	69	123

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	OKLAHOMA						126,129
88-309	4-24-R. Commercial fisheries investigations	1966	4	58,088	1969	70	131,132 133
	4-25-D. Commercial fisheries statistics	1967	2	32,235	1969	110	133
	4-60-R. Flathead catfish movements	1969	2	34,000		73	
	2-140-R. Planning for the development of the commercial fishery in Oklahoma	1971	1	3,250		55	
	2-154-R. Oklahoma commercial fishing industry management program	1971	3	100,000		61	
	OREGON						
88-309	1-3-R. Study on the distribution and abundance of pink shrimp in the Pacific Ocean off Oregon	1965	5	141,832	1970	102	
	1-4-R. Investigation of the abundance and recruitment of bottomfish off Oregon with emphasis on Dover sole	1965	5	165,390	1970	80	
	1-5-R. Controlled rearing of Dungeness crab larvae and the influence of environmental conditions on their survival	1965	5	67,774	1970	95	127
	1-8-S. Coordination and planning	1965	5	32,634	1970	55	
	1-10-D. Development of the shad industry	1966	4	71,771	1970	113	
	1-12-R. Utilization of hake, dogfish, and by-products of the fillet industry for protein supplements	1966	4	134,167	1970	113	118
	1-15-R. Processed hake in feed for mink	1965	3	18,153	1968	113	
	1-25-R. Utilization of hake for human food	1969	1	16,000	1970	113	
	1-27-R. Laboratory hatching and rearing of Pacific Coast clams and oysters	1967	3	62,983	1970	94	
	1-34-R. Preparation of marine protein concentrate from hake	1967	3	60,000	1970	113	

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	OREGON (CON.)						
	1-38-R. Biology of Columbia River shad and the development of selective commercial fishing gear	1967	1	12,000	1969	79	
	1-46-R. Boat charter	1967	3	76,800	1970	89	
	1-58-D. Development of new human food products from shad	1970	1	12,000		113	
	1-59-D. Utilization of hake for human food	1970	3	50,000		113	
	1-60-R. Clam-oyster-abalone larval rearing	1970	3	52,000		105	
	1-61-R. Data analysis - Dover sole stocks	1970	1	38,500		110	
	1-62-R. An evaluation of methods for determining movements of shrimp	1970	1	28,500		102	
	1-63-R. Discoloration of fresh and frozen crab meat	1970	3	44,250		113	
	1-64-R. Preparation of fish protein concentrate from hake	1970	1	18,000		113	
	1-66-R. Crab larval rearing	1970	3	50,500		105	
	1-68-S. Coordination	1970	3	29,400		55	
	1-69-R. Preparation of fish protein hydolysates	1970	2	28,000		114	
89-304	AFC-10. Shad and striped bass management study	1968	2	33,600	1970	79	
	AFC-11. Rearing ponds - North Nehalem River salmon hatchery	1967	1	172,000	1968	46	
	AFC-12. Planning and coordination	1967	4	19,000	1970	55	
	AFC-17. Construction of the Elk River salmon hatchery	1967	1	476,000	1968	46	
	AFC-18. Development and improvement of hatchery techniques for Pacific salmon and steelhead trout	1967	4	856,400	1970	84	
	AFC-19. Management of the troll salmon fishery with emphasis on the collection of data on shore and at sea for regulation formulation	1967	3	134,400	1970	84	124

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	OREGON (CON.)						
	AFCS-20. Evaluate, coordinate, and plan Pacific salmon research and management activities on a coastwide basis	1967	4	118,000	1969	56	
	AFC-21. Increased production of anadromous salmonids in Oregon coastal streams and lakes	1967	1	48,200	1968	84	
	AFC-22. Production and distribution of anadromous salmonids from the Alsea River salmon hatchery	1967	1	66,805	1968	66	
	AFC-23. Effects of logging on salmon populations in coastal streams	1968	3	64,400	1970	60	122
	AFC-25. Remove culvert and construct bridge to provide anadromous fish passage on Clear Creek, tributary to the Kilchis River	1968	1	10,000	1968	45	
	AFC-26. Research and management on wild and hatchery produced salmon and steelhead in Oregon south coastal streams	1968	3	100,000	1969	84	
	AFC-30. Hatch, rear, and release salmonids at the North Nehalem River salmon hatchery	1968	3	109,500	1970	66	
	AFC-35. Provide passage for salmonids on Oregon coastal streams	1968	1	31,500	1969	45	
	AFC-36. Hatch, rear, and release salmonids at the Elk River salmon hatchery	1968	2	91,750	1970	67	
	AFC-39. Salmon investigations on the northern Oregon coast	1968	2	173,600	1970	84	
	AFC-40. Construction supplemental rearing pond adjacent to Trask River salmon hatchery	1969	1	228,000	1970	46	
	AFC-43. Pink and chum salmon culture	1969	1	22,300	1970	105	
	AFC-45. Rear and release salmonids at the Trask River rearing pond	1970	3	107,100		67	
	AFC-46. Effects of logging on abundance of coho salmon	1970	3	83,000		70	
	AFC-47. Operation of the Elk River salmon hatchery	1970	3	183,000		67	

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	OREGON (CON.)						
	AFC-48. Coordination of Public Law 89-304	1970	3	12,600		56	
	AFC-49. Operation or rearing ponds - North Nehalem River salmon hatchery	1970	3	76,500		67	
	AFC-50. Improvement of salmon and steelhead trout hatchery techniques	1970	3	838,738		84	
	AFC-51. Salmon and steelhead mark processing center for Pacific Coast States	1970	3	200,500		110	
	AFC-52. Management of the troll salmon fishery	1970	3	157,200		84	
	AFC-53. Shad and striped bass management study	1970	3	61,500		79	
	AFC-54. Salmon research on coastal streams and reservoirs	1970	3	557,000		84	
	AFC-55. Culture of salmon acclimated to sea water	1970	3	30,000		106	
	AFC-59. Expansion of Elk River hatchery	1970	1	228,000		46	
	PENNSYLVANIA						
88-309	3-67-R. A study to establish a program to increase the production of high-value commercial fishes in Lake Erie	1967	3	180,000	1970	75	
	3-85-R. Mussel investigations	1968	1	20,000	1969	96	
	3-110-R. A study in the production of warmwater fish species in a vertical fish rearing facility	1970	3	48,750		106	
	3-112-R. Rearing trout in silos arranged in series	1970	3	105,000		106	
	3-147-D. National molluscan film	1971	2	10,000		64	
89-304	AFCS-1. Feasibility of the restoration of shad runs in the Brandywine Creek and its tributaries	1967	2	35,000	1969	79	
	AFC-4. Restoration of shad runs in the Brandywine Creek and its tributaries	1969	2	19,000	1970	79	

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	RHODE ISLAND						
88-309	3-43-R. Investigation of the deep sea red crab	1966	3	43,500	1969	95	123
	3-46-R. Investigation of the basic life history of the red crab	1966	3	21,600	1969	95	
	3-53-R. Testing one-boat pelagic trawls on small draggers	1966	1	20,000	1967	62	123
	3-57-R. Mollusk environmental modification and control studies	1966	3	11,275	1967	103	
	3-79-C. Wickford Marine Laboratory dock	1968	1	4,000	1968	99	
	3-80-D. Development of a management plan for the sea scallop in Rhode Island	1968	1	22,100	1969	56	
	3-90-R. Assessment of the efficiency of the Danish Vinge t awl over conventional New England drag nets	1968	1	12,900	1969	62	
	3-113-R. An experimental seed bay scallop stocking of selected Rhode Island waters	1969	2	70,000		100	
	3-138-R. The growth and movement of scup (Stenotomus chrysops) in Narragansett Bay	1971	2	36,500		87	
89-304	AFSC-1. Construction of fish ladders	1967	6	430,000		45	
	SOUTH CAROLINA						
88-309	2-2-R. Charting of subtidal oyster beds and experimental transplanting of seed oysters thereto from polluted seed oyster beds	1965	3	53,496	1968	99	124 126
	2-3-R. To manage and practice aquaculture in shrimp farm ponds and in large tanks under controlled conditions	1966	3	44,655	1969	106	
	2-36-C. To add a refrigerating unit to existing system for temperature control of saltwater culture tanks	1966	1	2,387	1967	49	
	2-69-R. Investigations into supplemental feeding of oysters	1968	1	11,600	1969	99	
	2-79-R (4b). Cooperative blue crab study - South Atlantic States	1969	1	25,000	1970	115	125 126

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	SOUTH CAROLINA (CON.)						
	2-105-R. Survey of oyster fishery of South Carolina	1970	2	65,000		99	
	2-110-R. An investigation of the offshore demersal fish resources of South Carolina	1970	1	12,200	1971	90	
	2-137-D. Development of an expanded commercial fisheries statistical program for South Carolina	1971	3	52,500		110	
	2-138-R. A study on the black sea bass (Centropristes striatus)	1971	2	16,260		87	
89-304	AFC-1. Survey of strugeon fishery of South Carolina	1967	1	10,000	1968	88	124
	AFC-4. Commercial anadromous fishery - Edisto River	1970	3	120,000		90	
	SOUTH DAKOTA						
88-309	4-18-D. Commercial fishery industry survey	1966	4	100,000	1971	110	
	4-21-D. Missouri reservoir fisheries product development and evaluation	1966	2	37,667	1968	114	133
	4-29-R. Effects of intensive bullhead removal in selected lakes in eastern South Dakota	1967	3	20,300	1969	73	
	4-37-B. Commercial fishing gear research and development for lakes and reservoirs in South Dakota	1968	3	13,535	1971	62	
	4-61-R. Paddlefish population study	1969	3	15,000		74	
	TENNESSEE						
88-309	4-5-R. Development of improved fishing methods for use in southeastern and southcentral reservoirs	1965	3	38,356	1968	62	
	4-31-R. Evaluation of whole fish meal as a protein supplement for swine	1967	1	5,000	1968	114	130
	4-40-B. Formula development and acceptability evaluation of selected seafood entrees	1968	2	17,993	1970	114	
	4-46-R. Freshwater mussel ecology - Kentucky Lake, Tennessee	1969	3	56,868		96	

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	TENNESSEE (CON.)						
	4-72-R. Investigations of parasites and diseases of cultured fishes	1970	1	6,667		107	
	2-142-R. Mechanisms of mercury transformation in bottom sediments	1971	1	20,000		70	
	2-144-R. Production of channel catfish in cages	1971	2	24,020		106	
	2-151-R. Studies of channel catfish virus disease	1971	1	6,667		108	
	TEXAS						
88-309	2-12-R. An evaluation of the effects of estuarine engineering projects	1966	3	75,775	1969	68	
	2-13-C. Construction of a Gulf research vessel	1966	1	122,300	1967	52	
	2-14-C. Coastal fisheries experimental station	1966	3	514,000	1969	49	126
	2-47-R. Northern Gulf of Mexico marine fisheries investigation	1967	3	229,896	1970	90	120
	2-48-D. Gulf of Mexico estuarine film	1967	2	9,500	1969	63	
	2-49-R. Commercial fishery landings statistical program - Study No. 1	1967	5	114,100	1971	110	
	2-55-R. Study of migratory patterns of fish and shellfish through a natural pass	1967	3	136,445	1970	103	
	2-62-D. Seafood marketing	1967	3	195,000	1970	66	
	2-65-D (4b). Oyster rehabilitation in San Antonio Bay	1968	1	5,568	1969	117	
	2-66-R. Experimental pond research planning	1968	1	6,400	1968	56	
	2-77-C. Construction of storage building, coastal fisheries experiment station	1968	1	25,000	1969	50	
	2-78-R. Saltwater pond research	1968	3	211,404		106	
	2-88-C. Dredging boat and water intake channels	1969	1	22,500	1969	67	
	2-99-C. Fence construction, coastal fisheries experiment station	1969	1	6,100	1970	50	

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	TEXAS (CON.)						
	2-109-R. Northwestern Gulf of Mexico marine fisheries investigation	1970	3	285,772		90	
	2-112-R. Ecological changes associated with the industrialization of Cedar Bayou and Trinity Bay, Texas	1970	1	49,995		60	
	2-122-C. Jetty construction, marine fishery research station	1970	1	40,000		50	
	2-132-R. The population and distribution of penaeid shrimp in lower Laguna Madre	1970	2	49,288		102	
	2-135-D. National molluscan film	1971	1	2,000		65	
	2-146-D. Commercial fishery landings statistical program - Study No. 2	1971	3	70,300		110	
	2-155-R. Evaluation of effects of various coastal construction methods	1971	2	38,771		70	
	2-160-R. Determination of fresh-water quality standards for the Guadalupe estuary and San Antonio Bay system, Texas	1971	3	219,045		68	
	UTAH						
88-309	6-10-R. Investigation of the intensity of natural selection upon different phenotypes (blood types) of rainbow trout in commercial trout rearing ponds reservoirs	1967	3	39,050	1970	74	
	6-13-R. Genetic studies of rainbow trout strains being maintained by commercial and agency hatcheries	1971	2	34,755		74	
	VERMONT						
88-309	3-59-R. Investigation of the commercial fisheries potential of Lake Champlain	1967	2	19,605	1970	71	
	3-148-D. National molluscan film	1971	1	10,000		65	
	VIRGINIA						
88-309	3-5-D. Investigation of potential for expansion of the industrial fishery of the mid-Atlantic bight	1965	5	310,731	1970	90	
	3-6-R. Production of disease-resistant oyster	1967	3	184,325	1970	107	

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	VIRGINIA (CON.)						
	3-6-R (4b). Production of disease-resistant oysters	1965	2	103,679	1967	115	
	3-7-R. Investigation of oyster larvae and spat and certain environmental factors in a horizontally stratified estuary	1965	1	140,800	1966	99	
	3-19-R. Characterization of coastal and estuarine fish nursery grounds as natural communities	1965	2	82,645	1967	68	
	3-62-D. Propagation of disease-resistant oysters	1967	1	290,000	1969	108	
	3-69-D. Consumer education and market development	1967	3	96,000	1970	66	
	3-77-R. A study of the soft and hard clam resources of Virginia	1967	3	131,200	1970	94	
	3-91-R (4b). Blue crab study in Chesapeake Bay - Virginia	1968	1	25,000	1969	115	
	3-118-D. Shell planting program	1970	3	300,000		99	
	3-124-R. An investigation into commercial aspects of the hard clam fishery and development of commercial harvest gear for harvest of coquus	1970	3	174,768		62	
	3-125-D. Virginia seafood marketing	1970	2	174,768		66	
	3-127-R. Testing of disease-resistant oysters	1970	1	23,750		107	
	3-141-D. National molluscan film	1970	2	16,000		65	
89-304	AFC-1. Biology and utilization of anadromous alosids	1967	4	600,165	1970	77	
	AFC-7. Biology and management of river herring and shad	1970	3	665,000		77	
89-720	JF-3-2. An ecological study of the jellyfish (Chrysaora quinquecirrha) in lower Chesapeake Bay	1968	3	377,560	1971	91	
	JF-3-9. Control measures for Chesapeake Bay jellyfishes	1971	3	360,000		91	

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	WASHINGTON						
88-309	1-17-S. Coordination and planning	1965	2	24,000	1968	56	
	1-18-R. Investigation of effects of specific areas of Grays Harbor on the emigration of yearling coho salmon from the rivers emptying into that harbor	1966	3	14,000	1969	84	
	1-21-C. Construction of small fishways	1966	1	28,000	1967	45	
	1-22-R. Monitor conditions of certain groundfish stocks, Washington trawl grounds	1966	4	369,080	1970	80	
	1-24-D. Inspection of oyster seed - new Asiatic sources	1966	1	6,000	1967	99	124
	1-29-R. Early marine life history chum and pink salmon	1966	1	16,000	1967	85	
	1-30-R. Field recovery, coded wire tag	1966	2	36,600	1968	85	
	1-31-R. Willapa oyster studies	1966	2	56,000	1968	99	
	1-32-R. Hatchery coho salmon, contribution to the fishery	1966	5	92,500	1971	85	
	1-33-D. Evaluation of dry feed for hatchery salmon	1966	4	171,000	1970	85	
	1-37-R. Analysis and publication of coded wire tag research data	1966	2	44,000	1968	85	122
	1-39-R. Mid-water trawl fisheries management investigations	1967	3	35,750	1970	63	
	1-40-R. Larval and estuarial studies, pink and chum salmon populations	1967	2	64,000	1969	85	
	1-41-R. Determination of the nutritive value of North Pacific fish meal for poultry	1967	3	36,000	1969	114	
	1-42-D. Subtidal hardshell clam fisheries development	1967	4	125,405	1971	94	
	1-43-R. Oyster dril (*Ocinebra japonica*) control	1967	4	55,600	1971	108	
	1-44-C. Construction of Puget Sound research laboratory	1968	3	438,000	1970	50	
	1-49-C. Bivalve larvae experimental rearing pond construction	1968	1	12,500	1969	44	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	WASHINGTON (CON.)						
	1-50-C. Samish hatchery concrete ponds construction	1969	1	67,662	1971	46	
	1-52-R. Dungeness crab study	1969	2	41,000	1971	94	
	1-54-R. Pink and chum salmon prediction studies	1970	2	38,000		85	
	1-55-R. Ocean salmon fisheries sampling	1970	1	72,123	1971	85	
	1-70-R. Monitoring conditions of certain groundfish stocks, Washington trawl grounds	1970	1	137,540		80	
	1-71-R. Mid-water trawl fishery data analysis	1970	2	52,000		110	
	1-72-D. Capital Lake fall chinook rearing program	1970	2	80,000		85	
	1-73-D. Hatchery dry feed field	1970	2	$80,000		86	
89-304	AFC-1. Salmon rearing operations	1967	1	392,000	1967	67	
	AFC-4. Planning and coordination	1967	4	22,000	1969	56	
	AFC-5. Construction of Soleduck salmon hatchery	1968	3	1,666,000	1970	47	
	AFC-8. Stream improvement planning	1967	1	20,000	1968	56	
	AFC-9. Samish salmon hatchery supplemental water supply and rearing pond system	1967	2	98,000	1969	47	
	AFC-12. Port Susan-Port Gardner pink salmon studies - stock separation and identification	1967	1	18,500	1968	86	
	AFC-13. Measurement of spawning success and fry quality of chum salmon utilizing natural and controlled spawning areas at Big Beef Creek, Washington	1967	3	306,022	1970	86	
	AFC-14. Gill net drop out study	1968	3	45,100	1970	86	
	AFC-15. Nooksack hatchery coho yearling pond construction	1968	1	30,000	1969	47	
	AFC-16. Simpson hatchery rearing pond construction	1968	1	92,000	1969	47	
	AFC-17. Issaquah hatchery coho yearling pond construction	1968	1	22,000	1969	47	
	AFC-23. Cascade River stream improvement	1968	1	9,200	1969	60	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
						Project	Publ.
		Year	Years	Dollars	Year	Page	Page
	WASHINGTON (CON.)						
	AFC-24. Mashel River stream improvement	1968	1	11,000	1969	60	
	AFC-25. Green River hatchery pond conversion	1969	1	87,000	1969	47	
	AFC-26. Skagit hatchery holding and rearing ponds	1969	1	135,884	1970	47	
	AFC-32. Mill Creek fish passage facility	1969	2	16,000	1970	45	
	AFC-33. Upper Mashel River stream improvement	1969	1	5,000	1969	60	
	AFC-35. Puget Sound resident coho study	1969	4	24,000	1970	86	
	AFC-36. Skykomish hatchery concrete pond construction	1969	1	69,000	1970	47	
	AFC-37. Stream catalogue - Puget Sound and Chehalis region	1969	2	52,000	1971	56	
	AFC-38. Spawning-gravel improvement	1969	1	9,000	1970	60	
	AFC-39. Upper Chehalis River stream improvement	1969	1	10,000	1970	60	
	AFC-40. Design for future program construction	1970	1	67,000	1971	56	
	AFC-43. North Fork Newaukeum River fish passage	1970	1	15,000	1970	46	
	AFC-45. Issaquah Ponds revision	1970	1	95,000	1970	47	
	AFC-46. Puget Sound resident coho study	1970	3	47,600		86	
	AFC-47. Fall chinook contribution to the fishery	1970	1	8,032		86	
	AFC-49. Nemah hatchery holding and rearing pond	1970	1	41,000	1971	47	
	AFC-50. Big Beef Creek chum salmon spawning success and fry quality	1970	3	355,590		86	
	AFC-51. Design and construction of Humptulips salmon hatchery	1970	3	1,380,000		47	
	AFC-52. Puyallup hatchery pond and pumping plant construction	1970	1	176,636		48	
	AFC-53. Hood Canal pond revision	1971	1	153,000		48	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	WASHINGTON (CON.)						
	AFC-54. Minter Creek adult holding and rearing pond	1971	1	75,000		48	
	AFC-56. 1971 Lake Washington sockeye tagging study	1971	1	13,524		86	
	WEST VIRGINIA						
88-309	3-58-R. Investigations of the commercial potential of fishery resources in West Virginia	1966	3	41,250	1969	73	
	3-96-R. Commercial fishery investigations	1969	1	3,600	1970	76	
	3-97-R. Mussel investigations	1969	2	61,250	1971	96	
	3-128-R. Commercial fishery investigations	1970	3	9,000		76	
	WISCONSIN						
88-309	4-7-R. Assessment of lake trout restoration in the Wisconsin waters of Lake Michigan	1965	3	115,665	1969	74	
	4-41-D. A study of the contribution of bait dealers and private fish hatchery operators to the commercial fish industry of Wisconsin	1968	2	6,000	1969	57	
	4-42-D. The alternatives for Lake Superior trout management - a system analysis	1968	1	5,800	1968	56	
	4-58-R. Lake Michigan and Superior assessment studies	1969	3	75,700		90	
	4-62-D. Economic aspects of lake trout management in Lake Superior	1969	1	3,750	1970	57	
	3-133-R. Status of fish populations in Pool 7 of the Mississippi River and probable effect of gill net fishery	1970	2	12,000		111	
89-304	AFC-2. Walleye population in respect to a possible commercial fishery	1967	1	15,064	1967	75	
	AFC-4. A comparative study of thyroidal, interrenal, and gonadal activity in the alewife	1968	2	14,000	1970	78	
	AFC-5. An investigation of the reproductive cycle of the alewife in Lake Michigan	1968	3	55,930		78	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	WISCONSIN (CON.)						
	AFC-6. Study of the population dynamics of juvenile and coregonids in Green Bay, Lake Michigan	1968	1	30,577	1969	78	
	AFC-8. Evaluation of commercial fishery potential of Wisconsin's boundary waters of Lake Superior	1969	1	2,000	1970	75	
	AFC-9. Mucus and osmoregulation in alewife and smelt	1970	3	55,000		78	
	AFC-10. Age, growth, and maturity of the smelt in Lake Michigan	1970	1	7,874		87	
	AFC-11. Evaluation of food-processing methods for Great Lakes anadromous fish	1971	3	74,598		87	
	WYOMING						
88-309	1-48-R. The commercial potential of non-game fish species in impounded waters	1968	3	121,616	1971	72	
	AMERICAN SAMOA						
88-309	H-8-D. A determination of the feasibility of developing offshore commercial fishing in American Samoa	1966	3	222,537	1969	60	
current	H-15-D. Development of pole and line skipjack tuna fishery in American Samoa	1970	3	242,250		60	
	H-16-D. Acquisition of multipurpose research vessel	1970	1	78,000		50	
	H-17-D. Acquisition of a prototype demonstration fishing vessel for American Samoa	1970	1	10,000		50	
	H-18-D. Statistical analysis of American Samoa's fisheries	1971	3	28,000		109	
	GUAM						
88-309	H-7-D. A study to determine the feasibility of developing a deepsea commercial fishing industry on Guam	1966	3	148,585	1969	61	124
current	H-12-D. Development of Guam's commercial fisheries potentials	1969	3	120,000		63	
	PUERTO RICO						
88-309	2-37-S. Coordination and planning	1966	4	153,200	1970	56	123
	2-38-C. Design and construction of an improved fishing boat	1966	2	7m600	1968	52	

Public Law	Project number and title	Date initiated	Duration	Estimated total cost	Date completed	Reference	
		Year	Years	Dollars	Year	Project Page	Publ. Page
	PUERTO RICO (CON.)						
	2-39-R. Gear research and testing of improved commercial fishing boats	1966	3	164,700	1969	61	124
	2-40-C. Construction of commercial fisheries laboratory	1966	4	250,000	1970	49	
	2-41-C. Construction of fishing port facilities	1967	4	250,000	1971	44	
	2-56-R. Fisheries statistical program	1967	4	200,000	1971	110	129
	2-70-R. Exploratory and test fishing for tuna	1968	2	240,500	1970	61	123
	2-71-D. Training of fishermen for the tuna industry	1968	1	5,786	1969	64	
	2-89-R. Gear research, exploratory fishing, and demonstration	1969	4	370,000		62	
	2-97-R. Investigations on the resource potential of the spiny lobster in Puerto Rico	1969	3	63,742		96	
	2-98-C. Construction of commercial fisheries laboratory facilities	1969	1	199,250	1971	49	
	2-104-R. Investigation of green tuna meat	1969	3	30,000		114	
	2-127-S. Coordination and administration	1970	3	131,400		55	
	2-136-D. Acquisition of general use equipment for a fishery laboratory	1971	1	22,100		49	
	2-147-C. Commercial fisheries laboratory facilities, equipment, and incidental expenditures	1971	1	30,800		49	
89-720	JF-2-6. Investigation of the biology and control of noxious coelenterates occurring in the coastal waters of Puerto Rico	1969	3	76,805		91	
	VIRGIN ISLANDS						
88-309	2-33-R. Study of the fisheries potential of the Virgin Islands	1966	3	109,334	1969	62	121
	2-96-R. Exploratory fishing for a source of nonciguatoxic sport and food fish	1969	1	26,833	1970	62	121
	2-121-R. Research and development of deep-water commercial and sport fisheries around the Virgin Islands plateau	1970	1	28,793		62	

PROJECT ANALYSIS

This section gives narrative for each project. Includes are project identification number, principal investigator, current fiscal year total cost (both non-Federal and Federal) for continuing projects, and year of completion for completed projects.

Projects are grouped under the type of activity rather than by State or Public Law. In doing so, the reader has all projects on a particular segment of the program, such as research, coordination and planning, or construction in one section.

Requests for any additional information about a project or reprint of any report should be made to the State agency or Cooperator. The State agencies and Cooperators, including addresses, are listed on pages

CONSTRUCTION

Seventy-six construction projects have been funded, of which 25 are continuing and 51 have been completed. Emphasis is on the construction of salmon hatcheries, fish screens, research vessels, and laboratories.

FISH CULTURE FACILITIES

Alabama 2-31-C — Johnie H. Crance — Completed 1968

Oyster rearing pond construction - A ½-acre pond was constructed adjacent to the Alabama Marine Resources Laboratory on Dauphin Island to study commercial rearing of oysters in saltwater ponds.

California 6-12-C — C.S. Kabel — Completed 1971

Shellfish laboratory - water supply construction and electrical power installation - Provided for construction of a sea-water supply and drain system and electrical service unit for the State-owned shellfish laboratory on Granite Creek, Monterey County.

Louisiana 2-63-C — J.D. Broom — Completed 1969

Construction of salt-water culture ponds - Sixteen ½-acre ponds were constructed on Grand Terre Island, Jefferson Parish, near the Louisiana Wild Life and Fisheries Commission marine laboratory. The ponds are used for culture of brown and white shrimps, as well as oysters and selected fishes.

Massachusetts 3-39-C — A. Russell Ceurvels — Completed 1967

Cat Cove dike - A water level control system was installed at the 8-acre Cat Cove impoundment so that the pool could be used for shellfish culture studies. The impoundment is on Salem Harbor in Salem, near the proposed site for a marine fisheries laboratory.

Massachusetts 3-52-C. — A. Russell Ceurvels — Completed 1968

Cat Cove pier and pool - Shellfish floats were installed at the Cat Cove impoundment pier, and the bottom of this 8-acre pool was stabilized to make the area suitable for the culture of shellfish. The impoundment is on Salem Harbor in Salem, near the proposed site for a marine fisheries laboratory.

Nebraska 4-17-D — Robert E. Thomas — Completed 1967

Design and construction of facilities relative to trapping and handling of commercial fish - Live-holding facilities for research on commercial fish in the North Platte River were constructed near Lewellen. Also, an electrical fish weir and trap were installed to observe movement and availability of fish.

Washington 1-49-C | Russel D. Webb | Completed 1969

Bivalve larvae experimental rearing pond construction - A lined concrete pond was constructed at the Point Whitney Shellfish Laboratory on Dabob Bay, Hood Canal. Because of a chronic shortage of Pacific oyster seed, this pond will be used to develop mass culture procedures which would be expanded to meet special needs of the commercial shellfish growers

FISH LANDING FACILITIES

Alabama 2-29-C | Johnie H. Crance | Completed 1967

Construction of public oyster landing facilities - Three public oyster landings were constructed on Heron Bay, Bladwin County. The landings enable oystermen to unload their catch in a protected area and close to the oyster-processing shops.

Puerto Rico 2-41-C | Rolf Juhl | Completed 1971

Construction of fishing port facilities - This project provided for construction of essential fishing port facilities at Barrero at Rincon, Puerto Neuvo at Vega Baja, Cerro Gordo at Vega Alta, Culebra Island, Punta Santiaga at Humacao, and Hucares at Naguabo, to facilitate and stimulate the fishing activity.

FISH SCREENS AND STREAM IMPROVEMENT FACILITIES

California AFC-6 | C.S. Kabel | Completed 1967

Scott Valley fish screen construction - Fish screen and trapping facilities were installed at the Scott Valley Irrigation District Diversion Canal to prevent losses of downstream migrant coho and chinook salmon and steelhead trout to the canal from the Scott River near Fort Jones, Siskiyou County.

California AFC-9 | John Radovich | Completed 1971

Banta-Carbona fish screen construction - A fish screen was constructed at Banta-Carbona Irrigation Diversion to prevent losses of downstream migrant chinook salmon to the diversion from San Joaquin River. The construction site is near Diablo, San Joaquin County.

California AFSC-10[1/] | James F. Keating | $2,000,000

Glenn-Colusa fish screen construction - Provides for construction of a fish screen to prevent loss of downstream migrant salmonids in the irrigation diversion of the Glenn-Colusa Irrigation District from the Sacramento River near Hamilton City, Glenn County.

California AFC-11 | C.S. Kabel | Completed 1971

El Solyo fish screen construction - Provided for construction of a fish screen to prevent loss of downstream migrant salmonids in the irrigation diversion in the El Solyo Irrigation District from the San Joaquin River near Vernalis, Stanislaus County.

Delaware AFSC-3[1/] | Charles A. Lesser | $230,000

Shad passageway construction on the Brandywine River - To construct fish passage facilities on 11 low-head dams on Brandywine Creek, tributary to Delaware River. Passage facilities would make available about 35 miles of spawning and nursery areas to anadromous fish, principally American shad.

Delaware AFSC-4[1/] | Robert A. Beck | $3,500

Restoration of shad runs in the Brandywine Creek and its tributaries - Results of a recently completed project indicated that the Brandywine Creek above impoundments was suitable for hatching shad eggs and that adult shad moved upstream through passage facilities provided at the first two obstructions. This project will continue construction of passage devices at upstream obstructions. Concurrent with the construction, spawning success of passed fish will be evaluated. Additionally, fertilized shad eggs will be collected from other runs and planted in the stream.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Maine AFC-6 | Fred Baird | $100,000

Stream improvement and fishway construction - Construction of fish passage facilities and/or removal of bypass hazards for upstream migration of anadromous fish, especially alewife, are underway on the lower Nanticoke, Birch Gunpowder, and Chester Rivers.

Maine AFC-15 | Investigator to be selected | $60,000

Fishway construction and stream improvement - The purpose of this project is to increase production and landings of commercial anadromous species in Maine through a fishway construction and stream improvement program.

Massachusetts AFC-1 | Clinton Watson | $31,400

Anadromous fish investigations - Fish passage needs for upstream movement of river herrings and American shad have been surveyed on coastal streams. Construction of passage facilities are underway on streams in Bristol and Barnstable Counties.

Massachusetts AFCS-9[1/] | Joseph DiCarlo | $95,000

Anadromous fisheries development - This project provides for plan, design, modify, and construct fish passage facilities in coastal streams in an effort to restore or establish new runs of anadromous fish.

New Hampshire AFC-1 | Allen I. Lewis | $67,000

Commercial fisheries development - To construct fish passage facilities at the first dam upstream from tidewater on the Exeter River, Rockingham County, for the upstream passage of alewife and American shad.

Oregon AFC-25 | Austin Magill | Completed 1968

Remove culvert and construct bridge to provide anadromous fish passage on Clear Creek, tributary to the Kilchis River - A culvert was removed and replaced with a precast concrete slab and wood piling bridge across to permit upstream passage of chinook, chum, and coho salmon in Clear Creek near Tillamook, Tillamook County.

Oregon AFC-35 | Austin Magill | Completed 1969

Provide passage for salmonids on Oregon coastal streams - Nine logjams and other obstructions were removed on Oregon coastal streams to provide access to 62 miles of spawning and nursery areas for salmonids. A "steep-pass" type fishway was constructed and six were repaired and modified to maintain passage of salmonids to about 60 miles of fish habitat and one salmon hatchery.

Rhode Island AFSC-1[1/] | John Cronan | $40,000

Construction of fish ladders - To construct fish ladders and/or removal of obstructions to provide upstream passage of alewife, American shad, and sea-run trout in Hunt River, Kent County, Annaquatucket River, Washington County, and Saugatucket River, Washington County.

Washington 1-21-C | Robert Kramer | Completed 1967

Construction of small fishway - Fishway was constructed and logjam removed on Hutchins Creek, tributary of Nooksack River in Whatcom County, to make available additional spawning and rearing areas to fall chinook and coho salmon.

Washington AFC-32 | Marshall Thayer | Completed 1970

Mill Creek fish passage facility - Provided for construction of a fish passage facility through a 9-foot falls in Mill Creek, tributary to the Bogachiel River, to open up about 5 miles of spawning and nursery areas to coho salmon. The site is near Forks in Clallam County.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Washington AFC-43 Marshall Thayer Completed 1970

North Fork Newaukum River fish passage - Adequate passage facilities were installed at a falls-cascade area to permit upstream passage of migrant coho salmon to about 9 miles of spawning and nursery area on the North Fork Newaukum River.

HATCHERIES AND HATCHERY FACILITIES

Alabama AFCS-5[1/] Investigator to be selected $40,000

Construction of an anadromous fish hatchery and rearing facility - This project is undertaken to acquire property and construct facilities for spawning, hatching, holding, and rearing striped bass and other anadromous fish.

California AFSC-1[1/] Alex Calhoun Completed 1971

Mad River hatchery construction - A salmon and steelhead trout hatchery with water reconditioning systems was constructed on the Mad River near Arcata, Humboldt County. When fully operative the hatchery will have potential annual production of 1 million yearling coho salmon and 5 million yearling chinook salmon.

California AFC-3 C.S. Kabel Completed 1971

Mad River hatchery fish ladder (Formerly Casper Creek egg-taking station) - Fish passage facility was constructed to provide entry of adult chinook and coho salmon and steelhead trout into egg-taking station of Mad River hatchery. (See California AFSC-1)

Idaho 1-9-C James F. Keating Completed 1969

Construction of Hayden Creek rearing pond - Two 1-acre ponds and related facilities for rearing chinook salmon and steelhead trout were constructed at an abandoned trout hatchery on Hayden Creek, tributary to the Lemki River.

Idaho 1-51-C James F. Keating $15,700

Construction of facilities at Hayden Creek ponds - Provides for construction of feed and equipment storage sheds at Hayden Creek rearing ponds constructed in 1969 under project 1-9-C.

Oregon AFC-11 Ernest R. Jefferies Completed 1968

Rearing ponds, North Nehalem River salmon hatchery - Six additional rearing ponds for yearling and coho and fall chinook salmon and a three-bedroom residence were constructed at the State-owned North Nehalem River salmon hatchery in Clatsop County.

Oregon AFC-17 Jim Von Domelen Completed 1968

Construction of the Elk River salmon hatchery - The hatchery was constructed on the Elk River in Curry County. It was put into operation in the fall of 1968 and is now rearing about 2 million coho and fall chinook annually for release in the State's southern coastal drainages.

Oregon AFC-40 Edward K. Neubauer Completed 1970

Construct supplemental rearing pond adjacent to Trask River salmon hatchery - Provided for construction of ½-acre dirt pond with water supply and fish handling facility for rearing salmon and steelhead trout at the Trask River salmon hatchery on the East Fork of Trask River, Tillamook County.

Oregon AFC-59 Edward K. Neubuaer $228,000

Expansion of Elk River hatchery - Provides for construction of an additional 10 rearing ponds and supporting facilities for production of fall chinook, coho, or steelhead trout. The additional ponds will invrease the rearing capacity of the hatchery by 50,000 pounds of fish.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife.

Washington AFC-5 Pursell D. Watt Completed 1970

Construction of Soleduck salmon hatchery - A salmon hatchery was constructed on the Soleduck River in Clallam County. When fully operative the hatchery will have a potential annual production of about 115,500 pounds of young salmon, which is calculated to yield about 58,000 salmon (435,000 pounds) to the fishery.

Washington AFC-9 Marshall Thayer Completed 1969

Samish salmon hatchery supplemental water supply and rearing pond system - Pump and transport facilities for supplemental hatchery well water supply and dentrification tower were installed at the State-owned Samish salmon hatchery near Burlington. Also, a rearing pond was constructed.

Washington AFC-15 Marshall Thayer Completed 1969

Nooksack hatchery coho yearling pond construction - A ½-acre yearling coho salmon rearing pond was added to the Nooksack State salmon hatchery located about 20 miles northeast of Bellingham, Whatcom County.

Washington AFC-16 R.D. Webb Completed 1969

Simpson hatchery rearing pond - At the State-owned Simpson salmon hatchery on the Satsop River, Grays Harbor County, an additional rearing pond was constructed for fall chinook and yearling coho salmon.

Washington AFC-17 Melvin Eby Completed 1969

Issaquah hatchery yearling coho rearing pond construction - To extend the time yearling coho salmon can be reared a new rearing pond was added to the State-owned Issaquah Hatchery located in King County.

Washington AFC-25 Marshall Thayer Completed 1969

Green River hatchery pond conversion - Four dirt bottom salmon rearing ponds were converted to eight concrete ponds, and the water systems were modified to accommodate the revised ponds. The work was at the State-owned Green River hatchery on the Big Soos Creek.

Washington AFC-26 Marshall Thayer Completed 1970

Skagit hatchery holding and rearing pond - This project provided for modification and enlargement of a dirt rearing pond to increase production of coho and fall chinook salmon at the State-owned Skagit hatchery on North Puget Sound, Skagit County.

Washington AFC-36 Russell K. Jones $69,000

Skykomish hatchery concrete pond construction - This project provides for construction of a series of ponds at the Skykomish hatchery, Skykomish County. The additional ponds will have the capacity to increase annual hatchery production by 24,000 pounds.

Washington AFC-45 Marshall Thayer Completed 1970

Issaquah Pond revision - Provided for asphalt lining of two existing dirt ponds and new concrete outlet structures at the State-owned Issaquah salmon hatchery, King County.

Washington AFC-49 Russell Webb Completed 1971

Nemah hatchery holding and rearing pond - Provided for enlargement and modernization of an existing dirt pond to a 1/3-acre asphalt-lined combination salmon adult holding, spawning, and juvenile rearing pond to increase station output.

Washington AFC-51 Marshall Thayer $132,000

Design and construction of Humptulips salmon hatchery - To design and construct a salmon hatchery with an initial capacity of 100,000 pounds of juvenile salmon production with certain capacities oversized to permit subsequent expansion. The station is located on Humptulips River near its confluence with outer Grays Harbor, Grays Harbor County.

Washington AFC-52 Russell Webb $176,636

Puyallup hatchery pond and pumping plant construction - To increase rearing capacity of the State-owned Puyallup salmon hatchery by construction of four new concrete ponds, two new ½-acre asphalt lined ponds, and a combination fishway and pumping station. This station is located near Orting, Pierce County.

Washington AFC-53 Russell Webb $153,000

Hood Canal pond revision - Existing releasing area is rebuilt into an adult holding pond to permit species segregation and to provide a pond for off-season juvenile salmon rearing which will increase this State-owned hatchery at Hoodsport (Mason County) output 15,000 pounds of chinook salmon annually.

Washington AFC-54 Russell Webb $75,000

Minter Creek adult holding and rearing pond - Provides for construction of a 50 by 180-foot asphalt-lined adult salmon holding facility which also will be used seasonally for juvenile rearing to increase the Minter Creek salmon hatchery (Pierce County) by an estimated 20,000 pounds of chinook salmon annually.

Washington 1-50-C Marshall Thayer Completed 1970

Samish hatchery concrete pond construction - Provided for construction of four additional concrete ponds which added about 24,000 pounds of juvenile salmon annually to the production of the State-owned Samish hatchery near Burlington.

LABORATORY

Alaska 5-12-C G.L. Ziemer Completed 1967

King Salmon headquarters - architectural plans - Master plan and specifications for the formation of a headquarters at King Salmon for the important Bristol Bay fishing area were completed. The plans were developed to enable construction over a period of years.

Maine 3-72-C Phillip L. Goggins Completed 1968

Laboratory and tank room construction - This project provides for construction and installation of needed equipment for investigators to carry out P.L. 88-309 projects at the State's Fisheries Research Station, Boothbay Harbor.

Maine 3-83-C Richard P. Choate Completed 1970

Marine research laboratory construction - The first unit of a new marine research laboratory was constructed at Boothbay Harbor. The two-story building consists primarily of office space, dry laboratories, and related space to carry out research studies on lobster, marine worms, and shrimp.

Maine AFCS-9[1/] Richard P. Choate $200,000

Phase II - marine research laboratory construction - The objective of this project is to construct the second phase of new marine research laboratory facilities at Boothbay Harbor.

Massachusetts 3-74-C A. Russell Ceurvels $400,000

Marine research laboratory construction - This project provides for construction of a marine research laboratory and installation of needed equipment at Cat Cove, Salem. The single-story structure will be about 60 feet by 90 feet and will provide research space for shellfish larviculture.

1/ Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Mississippi AFCS-2[1/] Thomas D. McIlwain Completed 1970

Anadromous fish laboratory construction - This project provided for construction of an anadromous fish research laboratory at the Gulf Coast Research Station in Ocean Springs and for the installation of needed equipment destroyed in Hurricane Camille.

New York 3-10-C David H. Wallace Completed 1969

Construction of a marine research and development laboratory - A seaside laboratory equipped with a saltwater system and other essential utilities was constructed in the village of Old Field, adjacent to Flax Pond, which is a saltwater estuary off Long Island Sound.

Puerto Rico 2-40-C Rolf Juhl Completed 1970

Construction of commercial fisheries laboratory - This project provided for construction of a laboratory and center for biological studies, exploratory fishing, gear research, technology studies, and economic and statistical studies for the research and development of commercial fisheries of Puerto Rico. The facility is located in Mayaguez, relatively close to the Puerto Rico College of Agriculture and Mechanic Arts, the Inter-American University, and the Institute of Marine Biology.

Puerto Rico 2-98-C Rolf Juhl Completed 1971

Construction of commercial fisheries laboratory facilities - Provided for construction of commercial fisheries laboratory building foundation and a roadway linking the laboratory with the main highway on Guanajibo Point south of Mayaguez. The laboratory was partly constructed under project number 2-40-C.

Puerto Rico 2-136-D Rolf Juhl $22,100

Acquisition of general use equipment for a fishery laboratory - Equipment, including water supply and pumping facilities and furniture, are purchased for new commercial fisheries research laboratory which was constructed under the program. The laboratory is located at Punta Guanajibo, Cabo Rojo.

Puerto Rico 2-147-C Rolf Juhl $30,800

Commercial fisheries laboratory facilities, equipment and incidental expenditures - This project provides for construction of a fence and purchase of accessway facilities and equipment at the research laboratory constructed under P.L. 88-309 at Punta Guanajibo, Cabo Rojo.

Rhode Island 3-79-C John M. Cronan Completed 1968

Wickford marine laboratory dock - To assure adequate and safe facilities for marine fisheries research, additional sections of the dock which support laboratory tanks and sundry equipment were installed. The laboratory is located in North Kingston.

South Carolina 2-36-C G. Robert Lunz Completed 1967

To add a refrigerating unit to existing system for temperature control of saltwater culture tanks - Refrigerating units to control temperature were installed in six large-volume experimental saltwater tanks used for research in pond cultivation of shrimp and supplementary feeding of oysters at Bears Bluff Laboratory.

Texas 2-14-C Terrance R. Leary Completed 1969

Coastal fisheries experiment station - This station was constructed on north shore of Matagorda Bay near Well Point, Calhoun County. It consists of the station, 21 ponds, and related structures to provide controlled habitat for marine research and demonstration. The ponds range in size from ½ acre to 4 acres.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Texas 2-77-C Terrance R. Leary Completed 1969

Construction of storage building, coastal fisheries experiment station - A storage building of about 1,600 square feet was designed and constructed on the site of the saltwater pond experiment station near Palacios. This structure will provide space for storage of fish food, vehicles, equipment, and limited office space.

Texas 2-99-C Terrance R. Leary Completed 1970

Fence construction, Coastal Fisheries Experiment Station - Provided for construction of approximately 2,030 feet of 6-foot chain link fence along the county roadside of the Coastal Fisheries Experiment Station constructed under project 2-77-C near Palacios.

Texas 2-122-C Terrance R. Leary $40,000

Jetty construction, marine fishery research station - Provides for construction of permanent jetties to afford protection to channels providing water and access to the Coastal Fisheries Experiment Station which was constructed under the Commercial Fisheries Research and Development Act.

Washington 1-44-C Russell Jones Completed 1970

Construction of Puget Sound laboratory - Under this project the Puget Sound research laboratory was constructed at Tumwater. The laboratory will provide the needed facilities and space to adequately study the commercial fishery resources of the State.

RESEARCH VESSELS

American Samoa H-16-R Stanley N. Swerdloff $70,000

Acquisition of multi-purpose research vessel - Provides for acquisition of a 50-foot vessel for research projects including pelagic and bottom fish surveys, exploratory fishing, and gear appraisal.

American Samoa H-17-D Stanley N. Swerdloff $10,000

Acquisition of a prototype demonstration fishing vessel for American Samoa - To acquire a small fishing vessel which will be used to demonstrate fisheries methods, potential, and benefits to trainees.

Georgia 2-35-C Charles M. Frisbie Completed 1968

Research vessel construction - Plans and specifications for construction of a vessel for conducting research on commercial fish species along the coast were completed. However, due to unavailability of construction funds, a modified trawler was purchased for the stated purpose.

Massachusetts 3-76-C Frank Grice Completed 1969

Marine research vessel acquisition - A 40-foot vessel was purchased for research on lobster and winter flounder in coastal waters. The vessel is equipped with radio communication, electronic sounding and navigation gear, and various types of research equipment.

Montana 1-20-C James H. Posewitz Completed 1967

Construction of fishery research vessel for Fort Peck Reservoir fishery investigations - A 35-foot vessel was constructed for research on fish of commercial potential, such as the goldeye, sucker, carp, and catfish in Fort Peck Reservoir in northeastern Montana.

New Hampshire 3-122-D Richard G. Seamans, Jr. $20,000

Acquisition of marine workboat - Provides for acquisition of a boat of a type and size to allow for the safe and efficient conduct of marine research and development projects in coastal waters.

Fig. 1 - Texas Parks and Wildlife research vessel Western Gulf was constructed under P.L. 88-309. This 72-foot steel hull trawler is used in studying shrimp and industrial fish of the Texas coast. Photo courtesy Texas Parks and Wildlife.

New York 3-104-C William S. Miller $175,000

Design and construction of shellfish survey vessel - Provides for design and construction of a survey vessel approximately 55 feet long with a beam of 16 feet and a draft of 3 feet 6 inches for shellfish work. The vessel will be equipped with both towed and escalator types of hydraulic dredging gear capable of operation in relatively shoal bay waters as well as in deep water.

North Carolina 2-51-C James Sterling Completed 1968

Equipping exploratory fishing vessel - The following equipment was installed on North Carolina's new research vessel Dan Moore for exploratory fishing at sea: "Capac" impressed current system for corrosion control, air conditioning system, refrigeration equipment for two insulated fish holds, and outriggers for "double-rigging."

North Carolina 2-73-C James Sterling Completed 1969

Equipping exploratory fishing vessel to increase research capabilities - The following equipment was purchased: Simrad fish scope, bathythermograph, winch and davit, midwater trawl, and shrimp pots.

Puerto Rico 2-38-C Rolf Juhl Completed 1968

Design and construction of an improved fishing boat - An improved fishing boat about 60 feet in length was constructed for research on the local commercial fishery.

Texas 2-13-C Henry W. Compton, Jr. Completed 1967

Construction of a Gulf research vessel - This 72-foot steel hull shrimp trawler, Western Gulf, was delivered in the spring of 1967. It is currently used in studying shrimp and industrial fish resources of the Texas coast.

COORDINATION AND PLANNING

Fifty coordination and planning projects have been approved and funded under the Federal Aid Program. Of these, 17 are continuing and 33 have been completed. The project activities are concerned primarily with fish resource and habit inventories, development of resource management and research plans, and administration and supervision of the State's Federal Aid Program.

Alabama 2-34-R Johnie H. Crance Completed 1970

Cooperative Gulf of Mexico estuarine inventory (Alabama) - This study of the estuarine areas was Alabama's part of a Gulf of Mexico estuarine inventory in cooperation with other Gulf States and the National Marine Fisheries Service. The inventory included the physical and biological characteristics of each estuarine zone to the 10-fathom isobath and consisted of four phases: area description, hydrology, sedimentology, and biology.

Alabama 2-143-R Wayne E. Swingle $7,830

Evaluation and planning of Alabama's marine resources and research and development requirements -- To plan needed research and development programs related to specific fisheries problems and establish objectives and priorities in accordance with available funds and facilities.

Alaska 5-1-S Gary Finger Completed 1969

Coordination - Provided for coordination and planning of Public Law 88-309 projects.

Alaska 5-14-D James W. Parker Completed 1968

Southeastern and Kodiak Island, Alaska, stream catalogs - Salmon escapement catalogs for southeastern Alaska Districts 10-15 for 1965-66 and for Kodiak 1965-67 were published.

Alaska 5-15-S Gary Finger $39,100

Coordination - Provides for supervision and administration of Public Law 88-309, Commercial Fisheries Research and Development Act as amended.

Alaska AFC-11 Gary Finger Completed 1970

Coordination - Provided for supervision and administration of Public Law 89-304 projects.

Alaska AFC-36 Gary Finger $40,300

Coordination and planning - This project provides for supervision, planning, and administration for Alaska's P.L. 89-304 as amended Federal Aid Program.

Arkansas 4-12-D William M. Bailey $8,000

Commercial fishery industry survey - The purpose of this study is to develop a statistical reporting system for all the commercial fisheries in the State of Arkansas. Fish farmers and commercial fishermen are interviewed to establish the base for refined surveys.

California 6-3-R John L. Baxter $141,500

Fisheries resources sea survey - This project is concerned with the distribution, abundance, and present and potential use of the fishery resources in the coastal waters of California and Baja California, Mexico, south to Bahia Magdalena. The primary fishery resources are anchovy, mackerel, and sardine.

California 6-5-S Stanley S. Kodel Completed 1971

Coordination - Provided for coordination and palnning of Public Law 88-309 projects.

Connecticut 3-33-S Richard L. Homes Completed 1968

Coordination - Provided for coordination and planning of Public Law 88-309 projects in fiscal years 1966-69.

Delaware 3-55-R Ted Ritchie Completed 1968

A resurvey of the condition and extent of the natural seed oyster beds in Delaware - The survey and evaluation of existing seed oyster beds in Delware Bay have been completed. Bottom type, abundance of predators and fouling organisms, and abundance and size of oysters present have been recorded.

Georgia 2-74-S W.W. Anderson Completed 1970

Coordination - Provided for coordination and planning of Public Law 88-309 projects.

Georgia 2-115-S W.W. Anderson $25,400

Coordination of P.L. 88-309 - To administer the Public Law 88-309 program and coordinate research activities.

Hawaii H-3-R Michio Takata Completed 1966

Central Pacific Tuna Conference - Provided for conference to outline research needs and program on bigeye, skipjack, and yellowfin tunas.

Hawaii H-9-R Michio Takata Completed 1966

Publication of Central Pacific Tuna Conference proceedings and background papers - Provided for publication of proceedings of the Governor's conference on Central Pacific fishery resources, as well as background papers utilized during the conference.

Louisiana 2-20-S T.B. Ford Completed 1970

Coordination - Provided for coordination and planning of Public Law 88-309 projects.

Louisiana 2-130-S — William S. Perret — $26,000

Coordination - To provide supervision and administration of Public Law 88-309 projects.

Maine FWAC-1 — Robert L. Dow — Completed 1969

Statewide comprehensive fish and wildlife management plan - Inventory of the commercial fishery resources as the initial activity leading to the development of an overall management plan for fish and wildlife resources of the State.

Maine FWAC-2 — Phillip Goggins — $17,910

Statewide comprehensive fish, wildlife, and marine management plan - Provides for development of a management plan which will maintain at an optimum level, through biological and ecological research of fish and wildlife resources.

Maine 3-70-S — Richard P. Choate — Completed 1970

Coordination of research and development - Provided for coordination and planning of Public Law 88-309 projects.

Maine 3-123-S — Richard P. Choate — $33,000

Coordination of research and development projects - To provide supervision and administration of Public Law 88-309 projects.

Maine AFSC-11[1/] — Robert L. Dow — Completed 1969

Statewide comprehensive fish and wildlife management plan - Knowledge and ideas on the anadromous fishery resources as the initial step leading to an overall management plan for fish and wildlife resources of the State were assembled.

Maine AFSC-13[1/] — Robert L. Dow — $12,000

Statewide comprehensive fish, wildlife, and marine management plan - The objective of this project is the formulation of a Statewide plan to provide for the conservation, including natural use, of the marine fish resources.

Maryland 3-65-S — George Murphy — Completed 1970

Coordination - Provided for coordination and planning of Public Law 88-309 projects.

Maryland AFC-6 — George Murphy — $13,000

Coordination service - To provide supervision and administration of Federal Aid projects under National Marine Fisheries Service.

Massachusetts 3-40-S — W. Leigh Bridges — Completed 1970

Coordination of research and development - Provided for coordination and planning of Public Law 88-309 projects.

Massachusetts 3-134-S — W. Leigh Bridges — $38,000

Coordination - Provides for coordination and planning of Public Law 88-309 and Public Law 89-304 projects.

Michigan AFSC-8[1/] — Raymond D. Schofield — Completed 1971

Great Lakes fish resource development study - This project was undertaken to develop a study outline for an evaluation of the current fisheries management programs on Lakes Huron, Michigan, and Superior.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Mississippi 2-25-R J.Y. Christmas Completed 1970

Cooperative Gulf of Mexico estuarine inventory and study, Mississippi - This study of the estuarine areas of Mississippi is part of a Gulf of Mexico estuarine inventory in cooperation with other Gulf States and the National Marine Fisheries Service. The inventory includes the physical and biological characteristics of each estuarine zone to the 10-fathom isobath and consists of four phases: area description, hydrology, sedimentology, and biology.

Mississippi 2-111-S J.Y. Christmas Completed 1970

Coordination and planning, fisheries resources research and development, Mississippi - The purpose of this project was to identify fishery research and development requirements for the enhancement of commercial fishery resources and to coordinate research under Public Law 88-309 with other State and Federal agencies and other research organizations.

New Jersey 3-78-R Paul E. Hamer Completed 1970

Inventory of major estuarine system - Provided for inventories of fish in estuarine waters and the habitat in which the fish occur.

New York 3-9-D William G. Bentley Completed 1970

Management planning for New York freshwater commercial fisheries - Plans were developed for better utilization of New York freshwater fish resources, including expansion of fisheries for underutilized species.

New York 3-84-S Samuel L. Finkelstein $28,000

Coordination of research - Provides for supervision and administration of Public Law 88-309 projects.

New York 3-119-R William A. Pearce Completed 1970

Development of New York State's freshwater commercial fisheries - The objective of this project was to develop an overall commercial fisheries management plan for Lake Ontario, eastern Lake Erie, and associated waters within New York State boundaries.

North Carolina 2-139-R Walter F. Goodwin $18,000

Plan for fisheries resources research and development, North Carolina - Under the project the relative status of the commercial fisheries and needs are determined for development of a 5-year research and development program.

Oklahoma 2-140-R Gary Mensinger $3,250

Planning for the development of the commercial fishery in Oklahoma - Problems related to reservoir-type commercial fisheries are identified based on accumulated information under completed projects under the program. Then, a program of studies would be developed around potential fisheries, i.e., minnows, freshwater mussels, and fish farming.

Oregon 1-8-S Robert E. Loeffel $8,450

Coordination - Provides for coordination and planning of Public Law 88-309 projects.

Oregon 1-68-S Robert E. Loeffel $7,350

Coordination - Provides for supervision and administration of Public Law 88-309 projects.

Oregon AFC-12 Austin R. Magill Completed 1970

Coordination - Provided for supervision and coordination of Public Law 89-304 projects.

Oregon AFC-20 Edwin K. Holmberg Completed 1969

Evaluate, coordinate, and plan Pacific salmon research and management activities on a coast-wide basis - The Salmon Compendium was updated through 1965 under supervision of the Pacific Salmon Inter-Agency Council.

Oregon AFC-48 Kelly R. Conover $4,000

Coordination of Public Law 89-304 - Provides for supervision and coordination of Public Law 89-304 projects.

Puerto Rico 2-37-S Rolf Juhl Completed 1970

Coordination - Provided for coordination and planning of Public Law 88-309 projects.

Puerto Rico 2-127-S Rolf Juhl $39,400

Coordination and administration - Provides for planning, coordination, and administration for program activities under the Commercial Fisheries Research and Development Act, P.L. 88-309 as amended

Rhode Island 3-80-D George W. Gray Completed 1969

Development of a management plan for sea scallops in Rhode Island waters - Scallop beds were sampled on a monthly basis to determine meat yield, weight, length, and growth, and were recorded. Catch records were recorded also.

Texas 2-66-R William R. Moore Completed 1968

Experimental pond research planning - Research program was developed for saltwater pond experiments at the newly constructed Seabrook Laboratory as Public Law 88-309 activity.

Washington 1-17-S Marshall Thayer Completed 1968

Coordination - Provided for coordination and planning of Public Law 88-309 projects in fiscal years 1965-68.

Washington AFC-4 Marshall Thayer Completed 1969

Coordination - Provided for coordination and planning of Public Law 89-304 projects.

Washington AFC-8 Robert Kramer Completed 1968

Stream improvement planning - Coastal streams were surveyed and priorities assigned to each one for improvement based on needs and cost/benefit analysis.

Washington AFC-37 Walt Williams Completed 1971

Stream catalog - Puget Sound and Chehalis region - Accumulated information gathered in the Puget Sound and Chehalis River Basin resource study concerning physical and environmental stream characteristics and anadromous fish species utilization in the water sheds of Puget Sound and Chehalis drainage systems was cataloged.

Washington AFC-40 Russell Jones Completed 1971

Design for future program construction - Construction plans, specifications, and cost estimates were prepared for about nine projects scheduled to be undertaken under P.L. 89-304.

Wisconsin 4-42-D William B. Lord Completed 1969

The alternatives for Lake Superior trout management - The problems inherent in the lake trout management program involving the interrelation of sport and commercial fishing interests were investigated.

ECONOMICS

Seven projects dealing with economic aspects of the commercial fisheries have been funded. All have been completed.

Georgia 2-46-R — D.J. Purcell — Completed 1968

Economic survey of the marine commercial fishing industry of Georgia - A survey of the economic importance of the seafood industry from the fishermen to the consumer has been completed. It also included the effect of physical and socio-economic factors on the consumption of seafoods and the future demands.

Maryland 3-42-D — Richard E. Suttor — Completed 1969

An economic study of the fisheries and seafood-processing industries with emphasis on the Chesapeake Bay - This study provided an analysis on the demand for seafood by region of the United States, the supply of seafood from the Chesapeake Bay fisheries, and factors affecting the size and location of the seafood-processing industries in the Chesapeake Bay area. The work was conducted at the University of Maryland, College Park.

Montana 1-45-D — Glenn R. Barth — Completed 1969

An economic study of marketing Montana commercial fisheries products - Markets for selected classes of goldeye, carp, and buffalofish were identified and evaluated.

North Dakota 4-20-D — David C. Nelson — Completed 1968

Commercial fish markets for North Dakota fisheries - The market demand, alternate uses, and potential demand for North Dakota fisheries have been identified. The State estimates that about 14 million pounds of fish are available to commercial markets.

Ohio 4-64-D — John M. Pierce — Completed 1971

Ohio's live bait industry: its extent, condition and problems - Under this project an evaluation was made of the economic importance of the live bait industry to Ohio's economy. Also, problems of the industry were investigated to assist in the development and growth of the industry.

Wisconsin 4-41-D — Sydney D. Staniforth — Completed 1968

A study of the contribution of bait dealers and private fish hatchery operators to the commercial fish industry of Wisconsin - Information was obtained on the bait dealers and private fish hatchery industry, including species of fish used, value, volume, capital, investment, and other related data. This information will be tabulated and reports prepared to assist in the development of long-range planning and operation of resource agencies.

Wisconsin 4-62-D — W.B. Lord — Completed 1970

Economic aspects of Lake Superior trout fishery - Economic information was obtained to assist in the establishment of regulatory, predator control, and stocking policies for lake trout in Wisconsin's waters of Lake Superior.

ENVIRONMENT IMPROVEMENT

Seventeen environmental or habitat improvement projects have been approved and funded under the Federal Aid Program. Project activities are concerned primarily with rehabilitation of spawning and nursery areas, stream clearance, and studies relative to effects of land use on abundance of fishery resources.

Alaska 5-8-R — Kenneth Dewley — Completed 1969

Monitoring the effects of land use on salmon production - The U.S. Forest Service and the Alaska Department of Fish and Game developed a monitoring program designed to detect environmental changes in streams before, during, and after logging. The project provided for continued monitoring of selected pink salmon streams in southeastern Alaska.

Alaska AFC-3 Robert S. Roys Completed 1970

Restoration and rehabilitation of earthquake-damaged pink and chum salmon streams in Prince William Sound, Alaska - Restorative work was completed on about 30 of the 181 salmon streams that were damaged by violent topographic changes during the March 1964 earthquake in southeastern Alaska. Survival of eggs and alevins were correlated with hydraulic data in the damaged zones and compared with similar data from "normal" zones.

Alaska AFC-30 John Solf $84,800

Stream rehabilitation, Prince William Sound - The objectives of this project are to continue restoration of earthquake-destroyed pink and chum salmon runs in Pince William Sound and rehabilitation of spawning areas where production has been seriously curtailed. Thus far under project AFC-3, 29 streams have received remedial treatment through an effective stream improvement program. Under this project restoration of 25 damaged streams is underway and restocking has begun where necessary to rebuild runs.

Florida 2-53-R Edwin A. Joyce, Jr. Completed 1970

A study of the effects of a commercial hydraulic clam dredge on benthic communities in estuarine areas - In Tampa Bay, Indian River, Apalachicola Bay, and Ten Thousand Islands, the effects by hydraulic dredging on finfish, crustaceans, and invertebrates important in the fisheries food chain in estuarine areas were investigated.

Kentucky 4-48-R Hunter M. Hancock Completed 1970

Influence of the effluent from a concentrated industrial complex on a large river - Murray State University made a 2-year study to determine how effluent released into the Tennessee River affects the distribution of fish, water quality, and the chemical composition of bottom muds, benthos, and fish tissue.

Minnesota AFC-2 Richard Hassinger Completed 1968

Anadromous fish habitat development - A survey was made of the needs for improvements of spawning habitat and streams used by Great Lakes fish that enter streams tributary to the North Shore of Lake Superior.

Maryland AFC-3. Ralph A. Bitely Completed 1970

Stream improvement program for anadromous fish management - This project included activities that range from a basic survey of all Maryland streams that provide or have a potential for providing spawning habitat for anadromous fish to their ultimate improvement and maintainance. Obstructions to free passage of fish were corrected where practicable. For streams where biological information is lacking or perhaps obsolete, an inventory of biological productivity was obtained.

Maryland 3-30-R J.R. Schubel Completed 1969

Suspended sediments in the Upper Chesapeake Bay - Suspended materials were collected monthly at the surface, mid-depth, and near the bottom at each of 31 stations in the Upper Chesapeake Bay from the Susquehanna River mouth to Pooles Island. The properties of the suspended materials are being used to determine the relative importance of the several origins. This project was transferred for funding under Public Law 89-304 (see Maryland AFC-4).

Maryland AFC-4 J.R. Schubel Completed 1970

Suspended sediments in Chesapeake Bay - This project was a followup of Maryland 3-30-R conducted under Public Law 88-309. It provided for an estimation of the relative contribution to suspended sediments in Chesapeake Bay from various sources and to estimate the amount of sediment which escapes Upper Chesapeake Bay.

Maryland AFC-5 J.R. Schubel $85,000

Suspended sediments in Chesapeake Bay - To investigate the effects of suspended sediments on the development of anadromous fish eggs and larvae in Upper Chesapeake Bay. Additionally, the source and characteristics of the suspended sediments will be investigated.

Fig. 2 - Drilling prior to blasting for rock removal to improve upstream passage of chinook and coho salmon to Upper Cascade River, Skagit County, Washington. Photo courtesy Washington Department of Fisheries.

Oregon AFC-23 James D. Hall Completed 1970

Effects of logging on salmon populations in coastal streams - Data on spawning populations, juvenile survival, production, and yield of smolts from three coastal streams during one 7-year prelogging inventory summarized for publication. Field data were collected on abundance of juvenile salmon after the area was logged.

Texas 2-112-R Roy B. Johnson, Jr. $26,094

Ecological changes associated with the industrialization of Cedar Bayou and Trinity Bay, Texas - The ecological changes brought about by discharge of waste from a steel mill into the lower reaches of Cedar Bayou are determined. Also, the effects of channel development and reversal of flow in the Bayou by the power company are investigated. Additionally, the effects of effluent from the power station on the ecology in Trinity Bay are investigated.

Washington AFC-23 Marshall Thayer Completed 1969

Cascade River stream improvement - Stream beds in two areas were altered by blasting and removal of rock to create water flow patterns and velocities favorable to passage of chinook and coho salmon with minimum delay to the upper Cascade River, Skagit County.

Washington AFC-24 Marshall Thayer Completed 1969

Mashel River stream improvement - Adequate fish passage for upstream migrant salmon was provided through logjam obstructions. Clearance of the logjams will make about 20 miles of stream available to chinook and coho salmon for spawning and rearing.

Washington AFC-33 Robert W. Kramer Completed 1969

Upper Mashel River stream improvement - Logjams were removed and stream gradient at cascades in small falls were reduced to provide passage for chinook, coho, and pink salmon to about 20 miles of spawning and nursery area in Mashel River tributary to the Nisqually River.

Washington AFC-38 David Heiser Completed 1970

Spawning-gravel improvement - The project defined factors of damage which affect spawning areas for salmon production which has been destroyed or reduced and investigated possible means of correcting or controlling such damages for optimum productivity.

Washington AFC-39 Robert W. Cramer Completed 1970

Upper Chehalis River stream improvement - The project provided for fish passage for upstream migrants at all stream flows at Fisk Falls in the Upper Chehalis River. Approximately 19 miles of spawning and rearing areas were made available by the project. The stream areas to be opened are suitable for production of chinook and coho salmon.

EXPLORATORY FISHING AND GEAR DEVELOPMENT

Twenty-one exploratory fishing and gear development projects have been approved and funded. Of these 7 are continuing and 14 have been completed. These projects are designed to develop underutilized resources, and to develop or apply new gear not now used by the industry.

American Samoa H-8-D James R. Holloway, Sr. Completed 1969

Determination of the feasibility of developing offshore commercial fishing in American Samoa - This project evaluated the techniques, vessels, and fishing gear most suitable for developing offshore commercial fishing, conducted exploratory fishing for marine animals of potential commercial value, and investigated the economic potential for the fishery products in the island and elsewhere.

American Samoa H-15-D James R. Holloway, Sr. $20,251

Development of a pole and line skipjack tuna fishery in American Samoa - Objectives of this project will be to determine the distribution and abundance of bait fish in Samoa waters.

Georgia 2-68-R | Walter F. Goodwin | Completed 1970

Exploratory study of the commercial marine resources of the Georgia coast - Exploratory cruises were conducted on a seasonal basis to evaluate the commercial potential of pelagic and demersal food fish, calico scallops, and hard clams inside 10 fathoms off the Georgia coast.

Guam H-7-D | Isaac I. Ikehara | Completed 1969

A study to determine the feasibility of developing a deep-sea commercial fishing industry on Guam - This study investigated the feasibility of adopting the Hawaiian-type sampans for fishing offshore around Guam, determined the relative potential importance of the various fish groups, and tested the marketability of the various species of fish that can be produced in commercial quantities from offshore waters.

Massachusetts 3-73-R | R. Barry Fisher | Completed 1968

Study of the feasibility and application of Danish seining to the Massachusetts fishing industry - Comparative fishing trials have been completed using a Danish seine and an otter trawl in the coastal waters of Massachusetts. Results of this study are inconclusive as to the application of this new gear to the industry.

Minnesota 4-22-D | Charles R. Burrows | Completed 1969

Development of under-ice horizontal sonar scanning equipment and techniques for locating fish schools - The development of gear and methods for locating schools of fish under the ice with sonar scanning equipment has been completed.

New Hampshire 3-105-R | William C. Ayer | Completed 1971

A comparative study of conventional and experimental inshore lobster gear - The main objective of this project was to analyze the efficiency and economy of commercial experimental and conventional inshore lobster gear in order to determine the best type of gear for harvesting the resources.

North Carolina AFC-5 | Edward G. McCoy | $65,344

Offshore anadromous fish exploratory fishing program - Exploratory fishing is conducted along the Outer Banks to determine the distribution and relative abundance of American shad, striped bass, and other anadromous fish.

Oklahoma 2-154-R | Gary Mensinger | $30,000

Oklahoma commercial fishing industry management program - This project is undertaken to obtain information on commercial fish, mussel, bait fish, and fish farming in reservoirs throughout the State with emphasis on the Keystone and Texoma Reservoirs, to more effectively manage and regulate these resources.

Puerto Rico 2-39-R | Rolf Juhl | Completed 1969

Gear research and testing of improved commercial fishing boats - The suitability of commercial fishing gear and boats needed for upgrading the fisheries of Puerto Rico was investigated. A Florida-type 37-foot lobster boat powered with a 160 hp. diesel was outfitted and fished. Pots and longlines were used to make the investigation.

Puerto Rico 2-70-R | Rolf Juhl | Completed 1970

Exploratory and test fishing for tuna - Limitations imposed by tuna conservations measures and foreign restrictions on traditional fishing grounds have created a need for developing other fishing areas. Exploratory cruises were made to determine if the Central Atlantic and Caribbean areas have enough tuna to support a purse seine fishery. The National Marine Fisheries Service provided a predetermined cruise track to give maximum coverage of the area.

Puerto Rico 2-89-R Rolf Juhl $70,000

Gear research, exploratory fishing and demonstrations - Improved boats, equipment, and gear are introduced to upgrade the Puerto Rico fisheries. Also, new fishing areas are located and improved fishing techniques and equipment are demonstrated.

Rhode Island 3-53-R Richard W. Burton Completed 1967

Operational testing of two pelagic trawls on two small draggers - This study off Point Judith has been completed, and recommendations have been made to the New England fishing industry relative to the nets, doors, and transducer system.

Rhode Island 3-90-R David R. Thomson Completed 1969

Assessment of the efficiency of the Danish Vinge trawl over conventional New England drag nets - Fishing trials have been completed with the Danish Vinge trawl in Rhode Island waters. The trawl was modified to fish off bottom primarily for sea herring and alewife. Daily catches averaged 40,000 pounds per vessel and exceeded the catches of the conventional New England bottom trawl. Vessel owners were impressed over the catches with the vinge trawl and have ordered several trawls. Results of this study have been made available to the New England fishing industry.

South Dakota 4-37-D Donald Warnick Completed 1971

Commercial fishing gear research and development for lakes and reservoirs in South Dakota - The catch data from floating trap nets constructed in 1968 were compared with catches from gill nets and frame nets normally used by commercial fishermen. These data were evaluated to determine the most efficient methods of harvesting buffalofish, carp, and sucker.

Tennessee 4-5-R Harry L. Hargis Completed 1968

Development of improved fishing methods for use in southeastern and southcentral reservoirs - Haul seines and trap nets were tested to determine their effectiveness in harvesting commercial fish species such as carp, buffalofish, and sucker.

Virgin Islands 2-33-R Arthur E. Dammann Completed 1969

Study of the fisheries potential of the Virgin Islands - Very little basic ecology and oceanography have been done on the fisheries in the Virgin Islands. The commercial fishery is still carried on by a high percentage of "pot" fishermen, and the quality of the product they supply the consumer is nearly always substandard. Under this project methods of harvesting and handling that have practical value in improving the fishery were investigated. Also, the extent to which long-range fishing is feasible was considered.

Virgin Islands 2-96-R Arthur E. Dammann Completed 1970

Exploratory fishing for a source of non-Ciguatoxic sport and food fish - The purpose of this project was to fish deep water at the edge of the 100-fathom curve in an attempt to locate fishing grounds which are free of Ciguatoxin sport and food fish and to establish a bio-assay for testing large numbers of individual fish for the presence of Ciguatoxin.

Virgin Islands 2-121-R Arthur E. Dammann $28,793

Research and development of deep water commercial and sport fisheries around the Virgin Islands plateau - Exploitable resources of bottom fishes around the 100-fathom curve are defined through exploratory fishing with reels, bottom lines, and traps. Also, commercial and sport fishermen are assisted in location of these resources and informed about methods of harvesting the fish.

Virginia 3-124-R Dexter S. Haven $57,368

An investigation into commercial aspect of the hard clam fishery and development of commercial gear for harvest of molluscs - This project is undertaken to develop a medium-sized tow hydraulic dredge for use in the commercial harvest of clams.

Washington 1-39-D | Allan E. Millikan | Completed 1970

Mid-water trawl fisheries management investigation - A new commercial fishery for Pacific hake began along the Washington coast during the fall of 1965. This project provided for the collection of statistical data on the fishery off the Washington coast, and continued experimental and exploratory fishing with mid-water trawl for harvesting hake and other species in commercial quantities in Puget Sound.

EXTENSION SERVICE

Twenty-four extension-type projects have been approved and funded under the Federal Aid Program. Of these 16 are continuing and 8 are completed.

Alabama 2-58-D	Johnie Crance	
Florida 2-50-D	Harmon Shields	
Louisiana 2-57-D	Theodore Ford	Completed 1969
Mississippi 2-59-D	William Demoran	
Texas 2-48-D	Terrance Leary	

Gulf of Mexico estuarine film - The five Gulf States and the National Marine Fisheries Service cooperated in the preparation and distribution of 28-minute and 12-minute, color, sound motion picture films showing the values and problems facing our Nation's estuaries.

Alabama 2-141-R | Wayne E. Swingle | $10,000

Publication and reproduction of research reports - Provides for publication of findings from Federal Aid and other research projects, purchase of reprints, and distribution of these publications and reprints.

California 6-16-R | Diane Rollins | $5,000

Food habits of albacore, bluefin tuna, and bonito in California waters - This project is for publication of findings of project 6-7-R, "Food habits study of organisms of the California current."

Florida 2-126-D | Charles B. Davies | $52,000

Fisheries technical assistance - This project is undertaken to train seafood quality control personnel in sanitation and quality retention and to provide advisory assistance to industry.

Guam H-12-R | Isaac I. Ikehara | $31,000

Development of Guam's commercial fisheries potentials - The purpose of this study is to develop methods to increase commercial fish catch efficiency by training fishermen in the use of more efficient techniques and to locate species of fish of commercial importance.

Illinois 4-35-D | Maxine Walzer | Completed 1970

Consumer education and market development - The general aims of this project were to develop and disseminate materials showing nutritional and economic advantages of feeding fishery products in State institutions, hospitals, and volume-feeding establishments; and provided for consumer education for the purpose of increasing consumption and demand for domestically produced fishery products.

Maine 3-13-D | Donald M. Harriman | $26,000

Maine marine fisheries extension service - This project is undertaken to disseminate information about the various commercial fisheries to the fishing industry along the coast of Maine and to potential members of the industry.

Maryland 3-71-D William Sieling Completed 1970

Maryland marine fisheries extension service - The purpose of this project was to disseminate to the fishing industry of tidewater Maryland and the elected legislative officials of the State current information relating to (1) applicable results of scientific investigations, (2) technological developments, (3) marketing opportunities, and (4) managerial policies and the reasons for their adoption.

Maryland 3-126-D William Sieling $21,740

Seafood extension service - Results of scientific investigations, technological developments, and marketing opportunities are disseminated to persons who harvest and process fishery resources.

Maryland 3-144-D George Murphy $8,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

Massachusetts 3-60-D H. Arnold Carr $13,700

Shellfish extension - Technical assistance and advice are provided to town and regional shellfish management programs. Management practices such as raft culture of oysters, collection and redistribution of spat, reseeding operations, predator control, and other activities designed to increase harvests are encouraged.

Massachusetts 3-109-D Investigator to be named $50,000

Massachusetts commercial fisheries extension service - Objectives of this project are to establish and conduct a commercial fisheries extension service providing on-site technical advisory services, dissemination of information and an avenue of communication between the fishing industry and research groups, designed to improve the economic posture of the Commonwealth's fishing community.

New Hampshire 3-146-D State personnel $4,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

New Jersey 3-145-D State personnel $8,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

New York 3-154-D Samuel L. Finkelstein $10,000

National molluscan film -To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

Pennsylvania 3-147-D Howard A. Miller $5,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

Puerto Rico 2-71-D Rolf Juhl Completed 1969

Training of fishermen for the tuna industry - A cadre of fishermen for high-seas and distant water fishing operations were trained. Arrangements were made with the Puerto Rican-based purse seine fleet operators to employ trainees for a period of 6 months.

Texas 2-135-D William B. Schwartz $2,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

Vermont 3-148-D Edward F. Kehoe $10,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

Virginia 3-141-D Edward Joseph $16,000

National molluscan film - To participate in a multi-State cooperative effort in the development of the shellfish fishery through the purchase and distribution of a film.

MARKET DEVELOPMENT

Eleven projects have been approved and funded under the Federal Aid Program. These projects are designed to develop and promote the consumption of fishery products.

Florida 2-11-D H.W. Shields Completed 1970

Marketing - This project promoted greater consumption of Florida seafood throughout the Southeast and other areas of the country through distribution and development of visual educational materials, new products, and new recipes. The main seafood resources in need of new markets are shrimp, crab, mullet, and Spanish mackerel.

Florida 2-125-D C.C. Shuman, Jr. $226,524

Fisheries marketing and extension service - The purpose of this project is to effect a free flow of commercial fisheries products in national trade channels in coordination and cooperation with industry, trade associations, and others.

Maine 3-24-D George H. Taylor Completed 1970

Promotion and market development - Public knowledge and awareness of a variety of Maine seafoods, particularly sardines, shrimp, and soft-shell clams, were promoted through educational films, food shows and related exhibitions, and by distribution of educational materials to chain stores, supermarkets, and other retail outlets.

Maine 3-115-D George H. Taylor $39,000

Market development - The objectives of this project are to improve market conditions and to increase the sale of Maine seafood products. This program will be developed in close cooperation with producers, processors, wholesalers, retailers, and consumers. Since neither the fishermen nor any of the various middlemen could exist without the consumer, primary emphasis will be placed on the development and use of consumer education techniques.

Maryland 3-66-D Gordon P. Hallock Completed 1971

Market development for Chesapeake Bay seafoods - Under this project, Maryland worked closely with the seafood industry and users to effect greater use of Chesapeake Bay seafoods by volume-feeding establishments and the general consumer. Educational materials such as video tapes, films, and recipe booklets suitable for restaurant and retail store seafood promotions were developed.

Maryland 3-132-D Gordon P. Hallock $126,000

Maryland seafood marketing - The objective of this project is to develop marketing opportunities for Chesapeake Bay seafood industry oysters, crabs, clams, rockfish, shad, herring, sea squab, and eels.

Massachusetts 3-50-D Frank Grice Completed 1970

Consumer education and market development - The overall objective of this project was to promote greater national use of northwest Atlantic seafoods and thus improve the economy of the New England fishing industry. A major effort was made through a program of consumer education that was patterned after the highly successful promotion of sea scallops landed in New Bedford.

Massachusetts 3-136-D Hugh F. O'Rourke $299,199

Massachusetts fisheries marketing program - The objective of this project is to educate and inform volume-feeding operators about Massachusetts fish and shellfish and correct serious supply and demand imbalances.

Texas 2-62-D Terrance Leary Completed 1970

Seafood marketing - To promote greater sale of Gulf seafoods, Texas undertook a combined consumer educational, market development, and market promotional program in cooperation with industry, Federal agencies, and other State agencies. This program was accomplished mainly through the development and distribution of educational materials such as video tapes, films, recipe leaflets, cookery demonstrations, and exhibits.

Virginia 3-69-D Fred W. Rawlinson Completed 1970

Consumer education and market development - Through the use of newspapers, radio, and TV media, promotional materials, and public relations, the Virginia Commission on Fisheries promoted greater use of Central Atlantic seafoods on a national and area basis, and thereby improved the economic position of the seafood industry.

Virginia 3-125-D Fred W. Rawlinson $40,000

Virginia seafood marketing - The objective of this project is to increase utilization of products of the sea.

OPERATION AND MAINTENANCE

Nine operation and maintenance projects have been approved and funded, of which 5 have been completed and 4 are continued.

New York 3-95-D David Wallace $47,000

Operation and maintenance of marine laboratory - This project provides operational funds for the newly constructed marine laboratory at Flax Pond. The laboratory, built under project 3-10-C, includes wet and dry laboratories along with salt- and freshwater systems and related equipment.

Oregon AFC-22 Austin Magill Completed 1968

Production and distribution of anadromous salmonids from the Alsea River salmon hatchery - Unfed fingerlings and excess adult salmon from the Alsea River hatchery in Lincoln County were released to populate areas made available by the State's stream clearance program and other areas having rearing potential.

Oregon AFC-30 Austin Magill Completed 1970

Hatch, rear, and release salmonids at the North Nehalem River salmon hatchery - This project supported operation costs of six rearing ponds at the North Nehalem salmon hatchery. The North Nehalem River hatchery is located about 70 miles west of Portland in Clatsop County and is operated for production of coho and fall chinook salmon and for the distribution of the fingerlings into the North Nehalem River and adjacent waters.

Oregon AFC-36 Austin Magill Completed 1970

Hatch, rear, and release salmonids at Elk River salmon hatchery - Adult salmon were spawned, their eggs fertilized, and hatched, and the resulting juveniles ponded and reared for varying lengths of time in concrete rearing ponds, and then liberated into Elk River or other nearby streams. This hatchery, located in Curry County, was constructed under P.L. 89-304 and put into operation in October 1968.

Oregon AFC-45 Kelly R. Conover $19,100

Rear and release salmonids at the Trask River rearing pond - Provides for operation of 1/3-acre salmon rearing pond on the East Fork of Trask River. About ½ million coho smolts will be reared and released in the East Fork or adjacent streams.

Oregon AFC-47 Carl Copper $57,500

Operation of the Elk River salmon hatchery - To collect and spawn adult salmon, receive eggs from other hatcheries, incubate the eggs, and rear the resulting fingerlings for release in Elk River and adjacent streams. Annual production is about 1 million yearlings comprised of fall chinook, coho, and steelhead.

Oregon AFC-49 Carl Copper $25,800

Operation of rearing ponds - North Nehalem River salmon hatchery - To collect and spawn adult salmon, receive eggs from other hatcheries, incubate eggs, and rear resulting fingerlings for release into North Nehalem River or adjacent streams.

Texas 2-88-C Terrance Leary Completed 1969

Dredging boat and water-intake channels - Boat and water-intake channels were dredged at the Coastal Fisheries Expe iment Station near Palacios, Calhoun County. The station was constructed under the Federal Aid Program. (Texas 2-14-C)

Washington AFC-1 Marshall Thayer Completed 1967

Salmon rearing operations - This project permitted full operation of 11 State-owned salmon hatcheries from July 1, 1966, to June 30, 1967. The Cooperator estimated that 264,375 coho and 145,425 chinook salmon thus would be made available to the fisheries which would otherwise have been lost.

RESEARCH

A total of 315 research projects have been approved and funded. Of these, 27 are concerned with the environment, 51 with freshwater finfish, 117 with marine fish, 94 with shellfish, 1 with marine worms, and 10 are concerned with jellyfish.

ENVIRONMENT

The 27 research projects on the environment are concerned mainly with inventories of the estuaries and the effect alteration of the environment has on the fish and other communities.

Alabama 2-119-R Edward I. Bault $12,100

A survey of the benthic organisms in coastal streams and brackish waters of Alabama - The distribution and abundance of benthic animals in coastal streams and low salinity waters in Baldwin and Mobile Counties are determined. Also, the distribution and abundance of these animals to hydrological and polluted conditions and to what extent they are utilized as food by commercial fish species are investigated.

Alabama 2-149-R Eddie B. May $31,000

The circulation and tidal flushing of Alabama's estuaries and the effect of shell dredging on suspended solids - This project provides for a study of the flushing rate and flow patterns in Mobile Bay estuaries as relates to pollution and the dispersion of suspended solids in shell dredging areas as relates to sedimentation.

Georgia 2-116-R W.W. Anderson $84,000

Studies on the ecology of Georgia's estuarine waters - This project provides for a study of the composition, distribution, and abundance of principal species of commercial fish inhabiting or utilizing estuarine environment along the Georgia coast. Ecological and biological factors associated with the species activities are investigated also.

Louisiana 2-22-R J.D. Broom Completed 1970

Ecology of Louisiana's estuarine waters - This project was undertaken to: (1) study the composition, general distribution, and relative abundance of the commercial (or potentially) important marine fauna in the estuaries and near offshore waters of the Louisiana coast, as well as ecological factors influencing this fauna, and (2) to determine possible means of preserving the estuarine areas.

Louisiana AFCS-1[1/] James T. Davis Completed 1970

Ecological factors affecting anadromous fishes of Lake Pontchartrain and its tributaries - About 8,000 fingerling striped bass were released at four sites in the Tchefuncte River to evaluate the feasibility of establishing runs by planting hatchery-produced fish. Alabama shad and Atlantic sturgeon were collected with trawl and trammel nets in Lakes Pontchartrain, Borgne, and Maurepas, and with hoop net and electrofishing in tributary streams.

Maryland 3-26-R D.W. Pritchard Completed 1967

Studies of the physical and chemical properties of the estuarine environment associated with fish kills - A monitoring program by the Johns Hopkins University provided several hundred temperature, salinity, dissolved oxygen, and pH observations on Upper Chesapeake Bay. Also, surveys of fish kills and studies of blue crab movements were made in cooperation with the monitoring program.

Maryland 3-93-R H.T. Pfitzenmeyer $10,000

Effects of Maryland hydraulic dredge on soft-shell clams - This project will determine how seasonal hydraulic clam dredging affects present populations and recruitment of juvenile soft-shell clams. An area of the Maryland portion of Chesapeake Bay will be used for the removal of clams and mechanical disruption of the bottom. Samples will be taken every 4 months.

New Jersey 3-114-R Sidney S. Herman Completed 1971

A study of the base food chain relationships in coastal salt marsh ecosystems - This study was to evaluate the meiobenthic communities, their abundance, composition, and distribution, relative to the physical and chemical conditions of the overlying water and the sediment.

North Carolina 2-9-R Austin B. Williams Completed 1967

Studies on macroplanktonic crustaceans and ichthyoplankton of the Pamlico Sound complex - Data was obtained on how relative abundance and movement of larval shellfish and marine finfish are related to environmental changes caused by phosphate mining and other engineering projects.

Texas 2-12-R Roy B. Johnson, Jr. Completed 1969

An evaluation of the effects of estuarine engineering projects - Physical and biological data were obtained on how various engineering projects affect the ecology of Galveston Bay.

Texas 2-160-R Investigator to be selected $80,156

Determination of fresh water quantity standards for the Guadalupe estuary and San Antonio Bay system, Texas - Objective of this study is to obtain information to establish water allotments and water-quality standards for the Guadalupe estuary.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Virginia 3-19-R | Edwin B. Joseph | Completed 1967

Characteristics of coastal estuarine fish nursery ground as natural communities - The features of low-salinity nursery areas of the York River estuary suitable for larval and juvenile fishes of the coastal area are described. Also, the distribution and abundance of several important species were determined.

Freshwater:

Alaska 5-19-R | John Valentine | Completed 1970

Effects of land use in salmon production - The joint monitoring effort of the U.S. Forest Service and the Alaska Department of Fish and Game was extended for 1 year for the purpose of data analysis completion, to recommend future goals for this project, and to continue certain aspects of current data collection.

Alaska 5-24-R | Kenneth E. Durley | $28,800

Relationship between logging activities and salmon production - Natural and man-made changes in the environment are studies to better understand how these affect salmon production and to determine whether a useable measurement of such changes can be made.

California AFC-7 | John Hayes | Completed 1968

Eel and Mad River anadromous fish water requirements - Surveys of salmon and steelhead trout spawning and nursery areas in Van Duzen River and North Fork of Eel River were completed. Water requirements for seaward migratory juvenile salmonids and the relation between water discharge and usable spawning gravel were investigated.

Maryland 3-23-R | William Roosenburg | Completed 1967

Study of the effects of thermal pollution on (Crassostrea virginica) in the Patuxent estuary - A study of oyster growth, mortality, gonad development, and condition has been completed in the upper Patuxent estuary. Stations were located 1,000 feet to 7 miles from the heated water outfall of a new steam electric generating plant. Results showed that growth was lower near the plant than those farther removed. Mortality was low and normal for all stations.

Maryland AFCS-1[1/] | William R. Carter | Completed 1970

Ecological study of Susquehanna River and tributaries below Conowingo Dam and their contribution to the anadromous fish populations of upper Chesapeake Bay and the development of methods to eliminate massive fish mortalities below Conowingo Dam - Observations were made on the migratory behavior of adult clupeids during their upstream movement into the Susquehanna River and two major tributaries, Deer Creek and Octararo Creek. Fish were captured by pound net at the river mouth, marked with anchor tag, and released. Weekly measurements were taken at five stations on water temperature, pH, conductivity, dissolved oxygen, and turbidity.

North Dakota 4-55-R | John Owen | $16,000

A determination of nutrient exchanges and biological nutrient removal from Lake Ashtabula, North Dakota - Sources of nitrates and phosphates and nutrient exchanges will be determined, the purpose being to gain information to assist in the development of a long-term management plan for Lake Ashtabula relative to yellow perch and bullhead fisheries.

Ohio AFCS-1[1/] | C.E. Herdendorf | Completed 1970

A study of the physical characteristics of the major reef areas in the western basin of Lake Erie - The Ohio Geological Survey, in cooperation with the Geological Survey of Canada, made a marine seismic profiling survey in the western basin of Lake Erie. Seismic coverage, totaling 818 miles, was obtained about every 5 minutes of latitude and longitude west of Point Pelee in both Canada and United States waters.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Oklahoma 4-24-R Robert Summerfelt Completed 1969

Commercial fisheries investigations - The relation between sediment type and the distribution and abundanace of invertebrates and fishes was studied at Lake Carl Blackwell. Sediment surveys were made semiannually at five selected sites along each of 30 transects across the lake. Biological and hydrographic data were also collected.

Oregon AFC-46 James D. Hall $23,000

Effects of logging on abundance of coho salmon - This study is part of the Alsea Watershed Program designed to determine the effects of Douglas fir logging practices on the physical and biotic resources in small coastal watersheds. This project will determine the effects of timber harvest (clearcut vs. patchcut) on coho salmon rearing capacity of selected streams.

Tennessee 2-142-R Eung Bia Shin $20,000

Mechanisms of mercury transformation in bottom sediments - The project is undertaken at Vanderbilt University to determine the mechanisms by which the various forms of mercury are transformed into compounds such as methylmercury, whether the type of soil is a factor in the process, and the detention time of mercury and its compounds in a lake or reservoir.

Marine:

Alaska 5-9-R Peter B. Jackson and Jerry A. McCrary Completed 1969

Investigation of ecological factors limiting production of the Alaska Pandalid shrimp - Data were collected in southeastern Alaska for determination of age and growth, length-weight relation, sex changes, and ovigerous period of the pink and side-striped shrimps; similar, but not as extensive, data were collected for the humpy and spot shrimps.

Maryland 3-56-R Charles H. Southwick Completed 1969

Biologic and environmental control of Eurasian milfoil (Myriophyllum spicatum L.) in Chesapeake Bay - Excessive milfoil growth is an environmental problem that affects fish population abundance and growth and the proper utilization of fishery resources. This project was a biological study of Eurasian milfoil in upper Chesapeake Bay and tributaries, including Middle River, Seneca Creek, Back River, Saltpeter Creek, West River, and Rhode River. The aim was to find a means of biologic control.

Mississippi 2-42-R J.Y. Christmas Completed 1969

A seasonal study of nektonic and benthic faunas of the shallow Gulf off Mississippi out to the fifty-fathom curve - Monthly semiquantitative collections were made of the benthic fauna and the floating compoents, chiefly neuson, in the water layer of the Gulf off the Mississippi coast out to 50 fathoms. Together with the current work in the bays and sounds, this study covered the marine-estuarine littoral and shore fishes and crustaceans of economic importance on the Mississippi coast.

New Jersey 3-137-R Paul E. Hamer $89,000

Inventory of major estuarine systems - The species of fish which inhabit estuaries and their distribution, the chemical and physical attributes of the estuaries, and the uses man makes of these waters are determined.

Texas 2-155-D Investigator to be selected $18,821

Evaluation of effects of various coastal construction methods - This project is to determine the best procedure for marine construction work in estuarine areas for minimal habitat destruction along the Texas Gulf coast and produce a manual with guidelines for processing marine construction permits.

FINFISH (FRESHWATER)

Fifty-one research projects have been approved for work on freshwater finfish. Of these, 25 are continuing and 26 have been completed. Emphasis is on baitfish, buffalofish and carp, and channel catfish and bullhead. Other species included are lake herring, lake trout, paddlefish, rainbow trout, sucker, and walleye.

Baitfish:

Alabama 2-83-R — Wayne E. Single — Completed 1970

Survey of the live bait-shrimp industry in Alabama - The licensed live bait-shrimp dealers were surveyed to determine the landings from Alabama waters and composition and distribution of these landings, amount of shrimp sent to Alabama, capital investment of the dealers, and economic value to State and Gulf coast region.

Colorado 6-2-D — Robert E. Vincent — Completed 1970

Raising bait fishes in the Rocky Mountain States - The fathead minnow, Pimephales promelas, which is native to Colorado was considered for commercial production and sale as bait minnow in the Rocky Mountain area. Growth and mortality of this species as influenced by population density in experimental ponds were investigated.

Hawaii H-10-R — Garth I. Murphy — Completed 1969

Handling baitfish in Hawaii - Physiological studies were conducted on concentrations of lactic acid in the muscle of anchovy as a cause of mortality during captivity. Feeding and holding procedures that would permit indefinite confinement of this baitfish were investigated

Nevada 6-9-D — James E. Deacon — $18,109

Rearing baitfishes in the desert Southwest - This project is designed to determine the present volume and value of baitfish by species and the present sources and capability for expansion and to estimate future market needs based on present and projected visitor-use of the Lake Mead Recreation Area. Nevada Southern University is make this study.

Vermont 3-59-R — John K. Anderson — $5,000

Investigation of commercial fisheries potential of Lake Champlain - Information is obtained on the number and activities of live bait supplies along the lake to determine the economic value of the bait industry and seasonal demand for specific types of bait. This study is also concerned with the relative distribution and abundance by species and weight of existing fish populations which may be harvested commercially.

Buffalofish and carp:

Arizona 6-1-R — W.L. Minckley — Completed 1969

Investigation of commercial fishery potential in reservoirs - Populations of buffalofish, carp, and threadfin herring in reservoirs in central Arizona and lower Colorado River were investigated. Feasibility of harvesting these fishes on a sustained commercial basis was investigated. Production and marketing possibilities for the products were surveyed.

Arizona 6-11-R — W.L. Minckley — $24,240

Commercial fisheries potential of reservoirs - This is a continuation of project 6-1-R to investigate the populations of buffalofish, carp, and threadfin herring in reservoirs in central Arizona and lower Colorado River.

New Mexico 6-11-R | Douglas B. Jester | $17,000

Investigation on commercial fishery potential of rough fish species - New Mexico State University is gathering and analyzing data to determine the feasible utilization of underused fish species in Elephant Butte and Caballo Reservoirs. The population structure, growth characteristics, seasonal movement, concentrations, and harvest methods for the buffalofishes, river carpsucker, carp, and gizzard shad are being investigated.

Wyoming 1-48-R | George T. Baxter | $36,183

Commercial potential of non-game species in impounded waters - University of Wyoming is making population studies at Ocean Lake and Seminoe Reservoir to estimate the potential abundance of non-game fish species, primarily carp and white sucker.

Channel catfish and bullhead:

Arkansas 4-53-R | R.V. Kilambi | $12,896

Influence of temperature and photoperiod on growth, food consumption, and food conversion efficiency on blue catfish, Ictalurus furcatus (Lesueur) - This project provides for an evaluation of the influence of temperature and photoperiod on growth, food consumption, and food conversion efficiency of the fingerling blue catfish and to investigate the changes in the above processes brought about by the age of the experimental fish.

Illinois 4-50-R | William M. Lewis | $14,620

Significance of ionic content of water in determining the growth and handling quality of channel catfish - To determine if the various dissolved salts in water have a detectable effect upon the growth and handling quality of channel catfish under conditions of dense populations characteristic of fish farming.

Kansas 4-1-R | Roy E. Schoonover | Completed 1968

Investigation on digestion and metabolism of the channel catfish - Six ponds at the Tuttle Creek Fisheries Research Laboratory near Manhattan were each stocked with 300 age-class II channel catfish. Fish in three ponds were fed formulated freshwater fish meal, and fish in the other three ponds were fed formulated marine fish meal. At 2-week intervals the fish populations were sampled to study growth under various feeding regimes during various seasons.

Kansas 4-45-R | Roy E. Schoonover | $28,000

Investigations on nutrition and metabolism of catfish and utilization of fisheries products - This study, subcontracted to Kansas State University, will provide additional information on the nutritional factors affecting channel catfish. Carbohydrate and energy utilization during feeding, during the period of nonfeeding, and under varying temperature conditions are being studied. Experiments on protein metabolism are also underway.

Kentucky 4-27-R | Hunter M. Hancock | Completed 1968

Catfish fishery investigations - Murray State University Biological Station investigated the catfish fisheries on Kentucky Lake from Kentucky Dam to the Tennessee State line. Various size hoop nets were fished under different conditions to determine how efficient and selective these nets are in catching channel and blue catfishes.

Kentucky 4-70-R | Hunter M. Hancock | $4,000

Kentucky Lake commercial catfish catch analysis - Commercial catch composition, age, growth, and condition of Kentucky Lake catfish are determined.

Minnesota 4-44-R | Charles Burrows | Completed 1970

A physiological study of thermal stress in channel catfish - This study was primarily concerned with how temperature changes in rivers affect the catalytic properties of heptic catalese enzyme in channel catfish. An attempt was made to characterize this enzyme in the livers of fish taken from thermally unpolluted waters.

North Dakota 4-15-R John Owen Completed 1970

Garrison Reservoir commercial fisheries investigations - The life history of catfish, goldeye, and yellow perch were studied. Also investigated was the behavior of these fish in response to physical factors, such as turbidity, which are associated with reservoirs.

North Dakota 4-30-R John Owen Completed 1969

A study of the commercial fishery potential of Lake Ashtabula - Movements, growth, and population structure of bullheads and yellow perch were investigated. Also, populations density and rate of growth before and after harvest were investigated.

North Dakota 4-69-R John Owen $8,500

Lake Sakakawea commercial fisheries investigations - The objectives of this project are to study the movement of channel catfish, basic biology of the river carpsucker in Lake Sakakawea, and growth of goldeye in Lakes Sakakawea and Oahe.

Ohio 4-6-R Russell Scholl Completed 1969

Lake Erie commercial fisheries research - Methods of predicting the harvestable crops of channel catfish and white bass and properly harvesting these resources were investigated in Sandusky Bay. Biological data and life history information were collected, and gill net selectivity was investigated.

Ohio 4-56-R Russell School $17,500

Fisheries investigations - Lake Erie - Determinations are being made of the economic and commercial importance of white bass and channel catfish in Lake Erie and Sandusky Bay, their relative abundance in Lake Erie and Sandusky Bay, and the effectiveness of various commercial gears upon these species so that accurate predictions of harvestable crops can be effected.

Oklahoma 4-60-R Robert Summerfelt $18,860

Flathead catfish movements - The homing range and the homing ability of flathead catfish and environmental factors which influence this species activities and movements are investigated. Also, population density, fishing, and natural mortality will be determined.

South Dakota 4-29-R Charles Backlund Completed 1969

Effects of intensive bullhead removal in selected lakes in eastern South Dakota - Three shallow fertile lakes in counties east of the Missouri River were fished continuously with bullhead pockets to reduce the bullhead populations to the lowest possible level. Measurements were made to determine how their removal affects their population structure and to determine what percentage of the younger bullheads must be removed to produce a vigorous population.

West Virginia 3-58-R Roger Schoumacher Completed 1969

Investigation of the commercial potential of fishery resources in West Virginia - Commercial potential of channel catfish and mussels along the Ohio and Kanawha Rivers were investigated. The catch of nets set at selected locations along the Ohio River was evaluated for size and age composition of the catfish population.

Lake herring:

Minnesota 4-8-R Charles R. Burrows Completed 1969

Minnesota commercial fisheries improvement - western Lake Superior - The University of Minnesota made a study to obtain life history information on species associated with the lake herring. Of special interest were food habits, distribution, and abundance.

Lake trout:

Michigan 4-2-R — Myrl Keller — Completed 1969

Surveillance of lake trout restoration in Michigan waters of Lake Michigan - Lake trout stocks were assessed in the northerly areas of Lake Michigan where hatchery-produced lake trout were released and where sea lamprey control efforts began.

Michigan 4-59-R — Myrl Keller — $25,334

Lake trout restoration studies - Objectives of the study are to assess and describe condition of introduced lake trout stocks in Michigan waters of Lake Michigan. Evaluation of the stocks will proceed in conjunction with programs to control sea lamprey and reestablish lake trout and other salmonid species.

Minnesota 4-38-R — Charles Burrows — Completed 1971

Laker Superior commercial fisheries assessment studies - The primary aim of this work was to ascertain the condition of the lake trout and other commercial fish stocks in Minnesota waters of Lake Superior. To meet this aim, the progress and effectiveness of sea lamprey control in local areas and the survival and dispersal of stocked lake trout were investigated. The abundance and distribution of other commercial fish populations, as well as the commercial production, were also investigated.

Wisconsin 4-7-R — Ronald Poff — Completed 1969

Assessment of lake trout restoration in the Wisconsin waters of Lake Michigan - This project was a part of the broad assessment of fish populations, including lake trout, in Lake Michigan. Fish samples, scales, stomachs, and other biological data, as well as statistical records of the fisheries, were collected in Wisconsin waters of Green Bay and Lake Michigan.

Paddlefish:

South Dakota 4-61-R — Charles Backlund — $4,000

Paddlefish population study - Information is obtained for management to maintain a balanced harvest of paddlefish based on the potential of the resource.

Rainbow trout:

Utah 6-10-R — Clair B. Stalnaker — Completed 1970

Investigation of the intensity of natural selection upon different phenotypes (blood types) of rainbow trout in commercial trout rearing ponds and reservoirs - The work was carried out at the Utah Fish and Game Department's Experimental Fish Hatchery at Logan and the Utah State University Fisheries laboratory. Information was obtained on blood groups among the breeding stock of rainbow trout used as brood stock for the fingerlings that are given commercial trout farmers. Also tests were developed that will provide information on the genetic control of the blood types found. The major aim was to eliminate undesirable genetypes from the breeding population.

Utah 6-13-R — Clair B. Stalnaker — $20,724

Genetic studies of rainbow trout strains being maintained by commercial and agency hatcheries - This project continues the State's research efforts to upgrade techniques used in production of rainbow trout at hatcheries through selective breeding. The work is being done at the Utah State University, Logan.

Suckers:

North Dakota 4-54-R — John Owen — Completed 1971

Investigation of gonadatrophins in stimulating spawning in white suckers - The controlled spawning of white suckers was investigated as a possible means of obtaining bait minnows commercially. Of the intramuscular injections used only fresh and dried pituitary and the HCG proved successful in inducing spawning.

Walleye:

Pennsylvania 3-67-R — Jon K. Anderson — $5,000

A study to establish a program to increase the production of high-value commercial fishes in Lake Erie - This project involves a study of the life history of the walleye, attempts to locate and propagate blue pike, and to conduct experimental coho salmon stocking program. It also provides equipment for a research vessel to study these fish and their environment in the eastern basin of Lake Erie.

Wisconsin AFC-2 — Russell Daly — Completed 1967

Walleye population study in respect to a possible commercial fishery - Walleye were tagged and released between Port Wing and Superior Harbor on Lake Superior to estimate population size and to observe migration. Age and growth determinations were made by examination of scales.

Wisconsin AFC-8 — George King — Completed 1970

Evaluation of commercial fishery potential of Wisconsin's boundary waters of Lake Superior - Migration patterns and population size of discrete walleye populations within the study area were investigated. The data accumulated will be used to determine whether the populations can withstand commercial fishing without dangering the resources.

Others:

Illinois 4-36-R — George W. Bennett — Completed 1970

Physiological and behavioral relationships among species of fishes - Channel catfish, golden shiner, and tilapia were isolated as individual species, as well as combined in separate combinations, to observe growth rate. Conditions of direct antagonistic behavior and of metabolic or hormonal action within and between these species were observed, also, Sam A. Parr Fisheries Research Center, Marion County, did this work.

Indiana 3-150-R — Thomas S. McComish — $25,200

Interspecies relationships of fish in Indiana waters of Lake Michigan - Biological data are collected on the fishery resources of Lake Michigan waters of Indiana to fill a void that exists in the Great Lakes States and Fishery Commission efforts to obtain information for a better understanding of the fish population dynamics, status of the stocks, and their relationships.

Iowa 4-11-R — Harry M. Harrison — $24,375

Industrial and commercial food fish investigations - Evaluations are made of the potential yield of fish with commercial and industrial value in large inland streams and reservoirs. Methods are developed to properly use these fish.

Maryland AFC-8 — C.J. O-Dell — $82,692

Survey of anadromous fish spawning areas - The purpose of this project is to conduct an inventory of streams in Maryland to determine which support or have potential to support spawning runs.

Michigan AFC-1 — Myrl Keller — Completed 1967

Appraisal of stocks of anadromous fishes in the Michigan waters of the Great Lakes - Scientific gear was purchased for the Michigan Department of Conservation's new research vessel Steelhead for research on commercial species in Lake Michigan.

Minnesota 4-39-R Charles Burrows $17,332

Minnesota commercial fisheries improvement - Factors determining the commercial catch of burbot, sauger, tullibee, and yellow pike in the American waters of Lake of the Woods are investigated. Catches are examined to determine the condition of the fish and size groups harvested.

Minnesota 3-143-R Lloyd L. Smith $8,282

Factors determining the relationships of the burbot to other associated species in Minnesota waters - Provides for an evaluation of the potential commercial importance of the burbot in the American waters of Lake-of-the-Woods and its relationship with the production of other species such as walleye and sauger which support existing commercial fisheries in Minnesota waters.

Montana 1-19-D James L. Cooper Completed 1970

Fort Peck Reservoir fishery investigation - This project provided for complete inventory of the fish populations in the Fort Peck Reservoir and an investigation of methods for selective fishing by local fishermen. Commercial species harvested included carp, buffalofishes, goldeye, catfish, burbot, suckers, and yellow perch.

Montana 1-56-D James L. Cooper $25,300

Commercial fisheries of Fort Peck Reservoir - Information on the life history, distribution, abundance, and availability of goldeye and buffalofish is obtained in Fort Peck Reservoir on the Missouri River.

Nebraska 4-4-R Robert E. Thomas Completed 1960

Establishment of the seasonal distribution and availability of commercial fish species in the waters of Nebraska - An electrical barrier and trap were used to collect fish on the North Platte River about 2 miles upstream from McConaughby Reservoir. Numbers, weight, time of capture, age composition, and sexual maturity were recorded for all species captured.

Nebraska 4-57-R Monte Madsen $26,719

Commercial fishery investigations - The primary objective of this project is to determine the potential and feasiblity of a commercial fishery on the North Platte River.

New York 3-9-D Fred Tingley Completed 1969

Management planning for New York freshwater commercial fisheries - Plans were developed for expanding the fisheries for whitefishes, lake herring, American eel, American smelt, carp, American shad, striped bass, and bait minnows in the St. Lawrence River, Lake Erie, and interior waters.

North Dakota 4-23-D Dean Hildebrand Completed 1967

A survey of commercial fisheries on the mainstem reservoirs of the Upper Missouri River System - To determine possible expansion of the commercial fisheries, the University of North Dakota has investigated Fort Peck Reservoir of Montana, Garrison Reservoir of North Dakota, and Oahe and Fort Randall Reservoirs of South Dakota.

West Virginia 3-96-R Roger Schoumacher Completed 1970

Commercial fishery investigations - Objectives for this project were to determine the abundance distribution, and age of potentially commercial fishes in the Ohio and Kanawha Rivers. Also, statistics on the commercial harvest were collected from fish taken in the Ohio River.

West Virginia 3-128-R Roger Schoumacher $2,700

Commercial fishery investigations - Provides for sampling fish from the Ohio River and major tributaries for mercury and other heavy metal concentrations.

FINFISH (MARINE)

One hundred and seventeen projects have been approved and funded for research on marine finfish. Of these 74 have been completed and 43 are continuing. Emphasis is on Pacific salmon, groundfishes, American shad, alewife, and striped bass.

Alewife and blueback herring:

Connecticut AFC-3 — William Lund, Jr. — Completed 1970

Investigation of the life histories and potential fishery of river herrings in Connecticut - Alewife and blueback herring captured by 500-foot seine in lower Connecticut River, marked with polystyrene dye, and released to observe migratory behavior. Ovarian samples were collected before and after spawning for fecundity studies. Observations were made also on growth and distribution of the young fish in fresh water.

Connecticut AFC-7 — William Lund, Jr. — $21,200

Estimating the number of river herring in the Connecticut River - River herrings (alewife and blueback herring) are captured by pound net in lower Connecticut River, marked and released to estimate abundance and evaluate the potential for commercial fishery on the species.

Connecticut 3-45-R — William Lund, Jr. — Completed 1968

Investigation of the life histories and potential fishery of river herrings - This project, initially funded under P.L. 88-309, has been tranferred for funding under P.L. 89-304. See Connecticut AFC-3.

Georgia AFC-6 — Walter F. Goodwin — Completed 1970

A study of the nursery areas and biology of juvenile anadromous fishes of the Altamaha River, Georgia - The distribution and relative abundance of juvenile anadromous fish, primarily river herrings, in the Altamaha River system were determined. Also, primary and secondary nursery areas were mapped.

Illinois AFC-2 — Harry Cook — $33,000

Histology of the thyroid and pituitary glands in the alewife - The thyroid and pituitary glands in alewife are studied on a seasonal basis in an effort to determine whether there are differences in these cells between freshwater and marine fish stocks.

Maine AFC-2 — Frederick T. Baird, Jr. — $24,000

Increased development of the commercial anadromous fishery resources of Maine - Published material on the condition and potential for improvement of the State's anadromous fishery resources, especially alewife and blueback herring, is updated through physical reconnaissance and biological field survey on coastal streams.

Maine AFC-14 — C.J. Walton — $25,000

Development and management of alewife, blueback, and shad resources - The overall objective of this study is to develop and manage the alewife and blueback herring resources in Maine's coastal streams. The immediate work is to determine the feasibility of using mechanical or truck-stocking procedures to develop and enhance runs of these fish.

Virginia AFC-1 — Jackson Davis — Completed 1970

Biology and utilization of anadromous alosids - Life history, biology, and utilization of alewife and blueback herring were studied in the tidal rivers of Virginia, including the James, York, and Rappahannock, to determine the additional fishing pressure the stocks can withstand without endangering the resource.

Virginia AFC-7 — Jackson Davis — $170,000

Biology and management of river herring and shad - To develop a sound biological basis for management of anadromous fish in a period of increasing multiple use of estuarine spawning grounds and nurseries and increasing exploitation.

Wisconsin AFC-4 Marcia V. Boyles Completed 1970

A comparative study of the thyroidal, interrenal, and gonadal activity in alewife - Histological examination was made of thyroid tissue of freshwater alewife to observe seasonal change in activity in the gland. Seasonal variations in interrenal activity and blood serum hormonal concentrations were investigated also.

Wisconsin AFC-5 Carroll R. Norden Completed 1970

An investigation of the reproductive cycle of the alewife in Lake Michigan - The growth and maturation of the gonads of alewife collected from Lake Michigan were studied. Histological preparations of the gonads were used to describe and compare developmental stages as they occur in young-of-the-year, age-groupI, age-group II, and older fish.

Wisconsin AFC-6 A.M. Beeton Completed 1969

Study of the population dynamics of juvenile alewife and coregonids in Green Bay, Lake Michigan - This project provided for construction and testing of experimental drop nets for determination of distribution and relative abundance of juvenile alewife and coregonids throughout Green Bay of Lake Michigan.

Wisconsin AFC-9 Jon G. Stanley $20,000

Mucus and osmoregulation in alewife and smelt - Seasonal cycles in mucus cell function in alewife and smelt as related to ancestral patterns of anadromous migration are studied, and the effects of thermal stress upon mucuous cell function and relationship between changes in the productive mucuous coat and osmorgulatory failure as a cause of mass mortality in alewife are determined.

American shad:

Connecticut AFC-1 William Leggett Completed 1969

A study of the rate and pattern of shad migration in the Connecticut River utilizing sonic tracking apparatus - Twenty-seven shad were marked with acoustic tags and tracked for varying distances in the Connecticut River to determined their rates and patterns of movement. Tracking emphasis was in the outfall areas of the Connecticut Yankee Atomic Power Company atomic plant at Haddam Neck located in the center of the commercial fishing area. Individual fish were tracked continuously for periods up to 56 hours; contract was reestablished with some fish after initial tracking had been discontinued.

Connecticut AFC-6 Robert A. Jones $21,000

A study of the migratory behavior of American shad - The purpose of this study is to investigate the orientation and migratory behavior of shad in Long Island Sound and at the mouth of the Connecticut River. In order to study mechanism of orientation, individual fish will be fitted with eye caps, have their nostrils plugged, and/or have their lateral line sensors destroyed, and tracking will be done by electrical tracking gear.

Delaware AFCS-1[1/] Charles Lesser Completed 1968

Feasibility of the restoration of the shad runs in the tributaries of the Delaware estuary - Fertilized shad eggs from the Susquehanna River stock were hatched in boxes placed in Brandywine Creek, tributary to Delaware River, to determine suitability of the stream for shad restoration. This creek originates in Pennsylvania and enters the Delaware at Wilmington.

Florida AFC-2 Edwin Joyce, Jr. Completed 1971

Investigations on the American shad in the St. Johns River - Abundance, seasonal migration, spawning activities, and other pertinent biological information were determined for American shad in the St. Johns River. An assessment of the possible effects of silt, pollution, physical disturbances, and fishing pressure was attempted also.

Georgia AFC-1 Walter F. Goodwin Completed 1968

Shad fishery of the Altamaha River, Georgia - The estimated weight of the shad population entering the Altamaha River, the fishing rate, and age composition of the commercial catch were determined. Factors affecting production were investigated also.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife.

New Jersey AFCS-1[1/] Ronald White, Jr. Completed 1968

Population and migration study of major anadromous fish - American shad were captured with gill nets in upper Delaware Bay and lower Delaware River, marked with Peterson disc tags, and released to obtain information on migration and origin of the stocks in the fishery. Most of the recaptures were made outside Delaware Bay and as far north as the St. John River, New Brunswick, Canada.

Oregon 1-38-R Arthur L. Oakley Completed 1969

Biology of Columbia River shad and the development of selective commercial fishing gear - Since little was known about shad in the Columbia River and no studies had been made since the early 1950's, this study provided current information on the status of this available resource. Studies of life history and of the reproductive potential and natural mortality of this species were made. Selective commercial fishing gear and methods necessary to allow the salmon to escape were developed.

Oregon AFC-10 Robert Loeffel Completed 1970

Shad and striped bass management study - Data needed to manage the shad and striped bass fisheries, such as catch, effort, age and sex composition of the catch, and spawning history, were obtained In Oregon coastal streams. In addition, about 1,000 adult shad in the Umpqua and Smith Rivers were marked with spaghetti tag to obtain information on upstream migration.

Oregon AFC-53 Alan M. McGie $20,300

Shad and striped bass management study - Catch statistics, fishing intensity, and catch-per-effort data for shad and striped bass are collected on the Siuslaw, Umpqua, Smith Coos, and Coquille Rivers. Data will be used to estimate size of runs in these rivers.

Pennsylvania AFCS-1[1/] David Daniels Completed 1969

Feasibility study of the restoration of shad runs in the tributaries of the Delaware River estuary - Fertilized shad eggs were placed in hatching boxes throughout the Pennsylvania section of Brandywine Creek, tributary to Delaware River, to determine the suitability of the stream for restoration of American shad.

Pennsylvania AFC-4 David Daniels $15,000

Restoration of shad runs in the Brandywine Creek and its tributaries - This is a joint study with the State of Delaware to restore shad runs in Brandywine Creek by building ladders at dams and transplanting fertilized eggs in upper reaches of the stream.

Groundfish:

Maryland 3-21-R Ted S.Y. Koo Completed 1967

Determination of the distribution and abundance of the winter flounder, Pseudopleuronectes americanus - Adult winter flounder were caught from November through May in deep or channel hauls with trawl throughout Chesapeake Bay and river mouths, except in lower Patuxent River.

Massachusetts 3-38-R Allen Petersen Completed 1969

Identification of winter flounder subpopulations - Tagging information is evaluated and experimental otter trawl data are analyzed to define the limits of the winter flounder populations along Massachusetts coast.

Massachusetts 3-87-R Phillip G. Coats $23,836

Winter flounder investigations - Knowledge of the contributions of estuarine winter flounder to the offshore fishery is needed to effectively manage and regulate this important fishery. Populations of juvenile and subadult flounders will be estimated by mark and recapture methods. Stratified random sampling with an otter trawl and plankton nets will be made in a selected area on Nantucket. Several types of tags for juvenile winter flounder will be evaluated under controlled conditions.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Oregon 1-4-R | Robert L. Demory | Completed 1970

Investigation of the abundance and recruitment of bottomfish off Oregon, with emphasis on Dover sole - Data on fluctuations in abundance and year-class strength of Dover, English and petrale soles and Pacffic ocean perch were evaluated. Techniques for determination of spawning success and abundance were investigated also.

Washington 1-22-R | Gene DiDonato | Completed 1970

Monitor condition of certain groundfish stocks, Washington trawl grounds - To obtain information on stock identity and migratory behavior of English sole, Pacific cod, and petrale sole, 5000 to 10,000 fish of each species were tagged and released and biological data collected. The information obtained will be useful in international fishery negotiations.

Washington 1-70-R | Gene DiDonato | $137,540

Monitor conditions of certain groundfish stocks, Washington trawl grounds - Information is obtained on the migration patterns and present status of the principal groundfish species captured by the trawl fleet through a port sampling program, tagging cruises, and intensive studies of the fish stocks.

Mackerel:

Hawaii H-4-R | Henry M. Sakuda | Completed 1969

Management investigation of the akule or jack mackerel (Trachurops crumenophthalmus) - About 5,000 young akule were tagged with internal anchor tag and released off the southern coast of Oahu to obtain information on growth and migratory behavior. Commercial akule fishery catch statistics were collected, tabulated, and analyzed to determine trends in abundance.

Marine worms:

Maine 3-16-R | Edwin P. Creaser | $36,000

Biological, environmental, and technological research on marine worms - Biological studies are conducted on life history, growth, and mortality rates, and predation and distribution of commercial marine worms (bloodworms and sandworms) and other annelid species of potential commercial use. Development of improved methods of harvesting, handling, and shipping are investigated also.

Pacific salmon:

Alaska 5-4-R | Daniel P. Hennick | Completed 1969

Pink salmon forecast research - From 1966 through 1969 abundance of pre-emergent fry of pink salmon was sampled in about 25 streams in Kodiak area, 12 in Cook Inlet area, and 100 in southeastern Alaska. Based on an abundance index, annual forecasts were made of size of returning adult runs. The optimum escapement for selected streams was also studied.

Alaska 5-5-R | Robert Panlus | Completed 1969

Kvichak River smolt study - Smolt counts were made as indexes for predicting the size of the returning sockeye salmon run and for estimating the optimum for the Kvichak River of Bristol Bay area.

Alaska 5-6-R | Allen Davis | Completed 1969

Cook Inlet sockeye salmon investigation - Research was conducted on annual downstream migration of sockeye salmon smolt, time of migration, and condition of the fish in the Kenai and Kasilof Rivers in an attempt to better understand the carrying capacity of the river system. Information is obtained, also, on spawning grounds, age and sex composition of the catch, and escapement of sockeye salmon to Cook Inlet drainages.

Alaska 5-7-R | Martin F. Eaton | Completed 1967

Investigation of factors limiting the production of introduced sockeye in lakes - Sockeye salmon were introduced into Frazer Lake by installing ladders at obstructions in outlet streams and by planting adult fish and eyed eggs in potential spawning areas of inlet streams. Survival and growth of juveniles were investigated to evaluate factors limiting production in the lake system.

Alaska 5-17-R | Ken Durley | Completed 1971

Pink salmon studies - This study expanded the State's pre-emergent fry forecast program in the Cook Inlet area for 1 additional year and in the southeastern Alaska area for 2 additional years.

Alaska 5-18-R | Allen Davis | $57,900

Sockeye salmon investigations - The magnitude of smolt out-migration from the major sockeye Cook Inlet system and the relationship of this out-migration to the return of the adults are determined. The magnitude and timing of the various stocks of Cook Inlet sockeye salmon are observed also.

Alaska AFC-2 | Lyle Simpson | Completed 1970

Sockeye salmon migration behavior and biological statistics collection, Southeastern Alaska - Weirs were operated at High Smith, Helta, Klawock, Chilkat, and Salmon Bays and at Tahitan, Klakas, and Redfish Lakes to obtain racial and age data on sockeye salmon stocks and to make counts of the escapement. As a result of small catches, tagging studies to obtain information on migratory routes of the marked fish were abandoned after the 1967 season.

Alaska AFC-4 | James L. Mauney | Completed 1970

Offshore salmon abundance index - Gill nets and longline gear were fished 15 to 30 miles offshore between Yakutat Bay and Dixon Entrance to make short-term forecasts of the timing and size of runs of chum, pink, and sockeye salmon as they near the inshore fisheries. The information provided industry with lead time for adjusting plant operations and disposition of the fishing fleet and gives the States data on which to base decisions for management of the runs.

Alaska AFC-6 | Kenneth R. Middleton | Completed 1970

Bristol Bay intermediate high seas inshore test fishing program - Gill nets were fished bewteen Port Moller and Cape Newenham to sample the sockeye salmon stocks and determine size, time, and age composition of the runs 6 to 8 days before the fish enter the inshore commercial fisheries. The study provided information useful for regulating the runs.

Alaska AFC-7 | Michael F. Geiger | Completed 1970

Arctic-Yukon-Kuskokwim anadromous fish investigations - Tag and recovery projects were conducted in the Arctic-Yukon-Kuskokwim management areas to determine population sizes and escapements, destination, movements, and timing of different stocks of king and chum salmon and sheefish.

Alaska AFC-8 | Roger F. Blakett | Completed 1970

Kodiak Island sockeye salmon investigations - Research was continued on the five major Kodiak Island sockeye salmon stocks, which originate in Karluk, Red, Upper Station, Akalura, and Frazer Lakes. The purposes of the studies were to identify stocks, count escapements and smolts, and obtain data on such life history features as timing of runs and age and sex of adults. In addition, adult fish, fry, and eyed eggs were transplanted to tributary streams of Frazer Lake to supplement natural reproduction.

Alaska AFC-9 Jack Lechner Completed 1968

Identification of red salmon stocks in the Cape Kumlik-Aniakchak Bay fishery (Chignik area) - Information was obtained on the origin of the red salmon stocks harvested by the Cape Kumlik purse seine fishery at Aniakchak Bay.

Alaska AFC-10 Robert S. Roys Completed 1970

Copper River sockeye salmon investigations - Salmon were tagged and released below and above Wood Canyon to assess escapement. Aerial and ground surveys of spawning areas were made to estimate the escapements and the use of the spawning areas.

Alaska AFC-12 Richard W. Tyler Completed 1968

Forecast of Kodiak Island pink salmon from abundance of juveniles in estuaries - This project is part of an overall study of the pink salmon runs to the Kodiak area by the Fisheries Research Institute of the University of Washington. Sampling methods currently used in forecasting were tested.

Alaska AFC-13 Duane E. Phinney Completed 1968

Optimum escapement studies of Chignik sockeye salmon - This project investigated the ecological association of young sockeye salmon and competitor species in two physically and biologically dissimilar lakes in the Chignik River system.

Alaska AFC-14 Daniel P. Hennick Completed 1970

Pink salmon forecast research - About 15 streams in the Chignik area of the Alaska Peninsula were sampled to obtain an index of the annual production of pink salmon fry.

Alaska AFC-15 Robert C. Francis Completed 1969

Computer simulation model of the Dixon Entrance salmon stocks - A conputer simulation model technique was used in a study of the Canada and United States salmon stocks and fisheries in the Dixon Entrance area of southeastern Alaska and northern British Columbia.

Alaska AFC-16 Allen Davis Completed 1970

Escapement enumeration investigations - An electric fish counter was used to evaluate and improve counts of salmon escapements in clear-water streams in Bristol Bay and the turbid waters of Kenai and Kasilof Rivers Cook Inlet. Counts from towers or the air were compared with those made by the electric counter.

Alaska AFC-17 Robert L. Burgner Completed 1969

Optimum escapement studies of Chignik sockeye salmon - Objective of this study was to determine the carrying capacity of the spawning areas in the Chignik system for adult salmon and of the lake and lagoon nursery areas for juvenile sockeye salmon. Additionally, the effect of parent escapement of different magnitudes on the success of progeny during lake residency was investigated.

Alaska AFC-20 FRI Staff Completed 1970

Studies of juvenile sockeye salmon in Iliamna Lake and Lake Clark - Information was obtained on abundance of sockeye fry and fingerling and sticklebacks to determine the distribution of these fish within the nursery areas and to determine the age, size, and weight of juveniles.

Alaska AFC-21 Robert Paulus Completed 1970

Kvichak River smolt study - This study provided total out-migration estimates or comparable annual indices of the age, composition, and number of sockeye salmon smolts leaving the Kvichak River.

Alaska AFC-22 William Parr Completed 1970

Optimum escapement studies of Chignik sockeye salmon - Regulation of sockeye salmon escapements to the two lakes in the Chignik system has been sharply modified in recent years as a result of conclusions drawn from intensive studies of past and present conditions in the lake system. Objectives of this study were to determine whether the changes in escapement levels are in fact having the expected and desired effect.

Alaska AFC-24 James Mauney $53,900

Offshore test fishing - Southeastern Alaska - Offshore fishing is conducted between Yakutat Bay and Dixon Entrance to develop a method for determining abundance of pink salmon shortly before the runs enter the inshore commercial fisheries. Stock identification, timing of runs, and home stream would be determined also.

Alaska AFC-25 Allen S. Davis $2,000

Sonic assessment of salmon escapements - Sonar units are installed and operated in Bristol Bay, Cook Inlet and Prince William Sound streams to evaluate the counter as a tool for measuring escapement of salmon

Alaska AFC-26 Robert C. Libida $42,300

Yukon River anadromous fish investigations - Work under this project will make escapement estimates for king and chum salmon runs and observations on size and age.

Alaska AFC-27 Roger F. Blackett $69,500

Kodiak sockeye rehabilitation - Project aims are to increase the size of sockeye salmon runs returning to Kodiak Island spawning systems by adult transplants or eyed egg and fry plants.

Alaska AFC-28 Larry Edfelt $15,700

Alaska Peninsula pink salmon forecast - The objectives of this project are to locate and map the major spawning riffles in the pink salmon streams of the Peninsula.

Alaska AFC-29 Stanley Moberly $31,400

Sockeye salmon studies - Southeastern Alaska - Collection of biological statistics are continued, and a determination is made of the sockeye salmon producing systems in Southeastern Alaska, the size of these stocks, and their racial characteristics.

Alaska AFC-31 Robert Paulus $44,800

Bristol Bay test fishing - This project provides an estimate of abundance and time of arrival of sockeye salmon bound for Bristol Bay before they enter the commercial fishery after they have been exposed to the Japanese high-seas fishery. It gives an estimate of the accuracy of forecasts and information on size and age composition of the runs 6 to 10 days before they enter the Bristol Bay fishery proper.

Alaska AFC-32 Peter J. Fridgen $48,100

Identification and enumeration of Copper River sockeye salmon stocks - Distribution and magnitude of sockeye salmon escapements are estimated by tag and recovery and by installation of sonar counters on glacial tributaries.

Alaska AFC-33 Robert Paulus $20,000

Sockeye smolt enumeration study - The Kvichak River produces the world's largest sockeye runs and is the mainstay of the Bristol Bay fishing industry. This project will obtain an estimate of smolt production which is basic information on which to make forecasts of returning runs--information which both management and industry use to plan manpower and money distribution.

Alaska AFC-34 William Parr $33,700

Species interrelationships in Chignik Lakes - Relationship between young sockeye salmon and resident fish species in Chignik Lakes as they compete for limited space and food is investigated.

Alaska AFC-35 Ole A. Mathisen $50,000

Carrying capacity of the sockeye salmon nursery areas in the Kvichak district, Bristol Bay, Alaska - The production of juvenile sockeye salmon as a function of large escapements in a continuous time sequence is observed.

California AFC-8 | Richard Hallock | Completed 1968

Delta migration study - Behavior pattern of adult king salmon as influenced by stream flow and other selected physical factors were observed by electronic tracking during the movements of the fish through the San Joaquin River Delta.

Indiana 4-43-R | James J. Barry | Completed 1971

Inter-species relationships of fish in Indiana waters of Lake Michigan - This project was designed to determine how long salmon inhabit the Indiana waters of Lake Michigan and to determine their behavioral pattern with other fish species. Collections of fish were made with gill nets and trawls, and fish were inspected aboard commercial vessels.

Oregon AFC-18 | Wallace Hublou | Completed 1970

Development and improvement of hatchery techniques for Pacific salmon and steelhead trout - Research was undertaken to improve the nutritional qualities and physical characteristics of pellets used to feed Pacific salmon and to develop methods for fish disease prevention, detection, and control in hatcheries. The work was done at the Fish Commission's laboratory at Clackamus and at Oregon State University.

Oregon AFC-19 | Robert Loeffel | Completed 1970

Management of the troll salmon fishery with emphasis on the collection of data on shore and at sea for regulation formulation - The use of barbless hooks as a management tool in the troll salmon fishery and the radionuclide Zn^{65} as an identification mark of Oregon-Washington coho salmon when mixed with salmon from other areas were investigated.

Oregon AFC-21 | Ernest R. Jefferies | Completed 1968

Increased production of anadromous salmonids in Oregon coastal streams and lakes - Coastal streams and lakes were surveyed to locate potential sources of hatchery water and salmon spawning and nursery areas, and to map barriers to fish migration.

Oregon AFC-26 | Robert Loeffel | Completed 1969

Research and management on wild and hatchery-produced salmon and steelhead in Oregon south coastal streams - The status of Elk River fall chinook salmon stocks was studied to determine the effects of hatchery-produced fish on natural stocks. Coincident and similar studies were made on the adjacent Sixes River, which was the experimental control.

Oregon AFC-39 | Robert Loeffel | Completed 1970

Salmon investigations on the Northern Oregon Coast - Results of hauling hatchery-produced adult and fry coho salmon to barren coastal streams and lakes and the planting of coho smolts into nonhatchery streams were evaluated.

Oregon AFC-50 | Kirk Beininger | $236,400

Improvement of salmon and steelhead trout hatchery techniques - The project provides for research on the biology of hatchery-reared salmon and steelhead trout and for studies for improvement of hatchery procedures and techniques.

Oregon AFC-52 | Robert Loeffel | $47,200

Management of the troll salmon fishery - This project is essentially a continuation and expansion of the State's ocean salmon fishery research program. Objectives are to compile catch statistics and mark recovery information, follow trends in fishing effort, evaluate the catch, and make final analysis of all data collected to date.

Oregon AFC-54 | Wallace Hublon | $124,000

Salmon research on coastal streams and reservoirs - This project is undertaken to obtain life history and ecological information for use in programming hatchery operations, predicting and controlling adverse effects of environmental alterations, investigating unused potential of coastal lakes and reservoirs, and measuring the status of coastal stocks of salmon.

Washington 1-18-R | Harry Senn | Completed 1969

Investigation of effects of Grays Harbor waters on coho emigration - Marked yearling coho salmon were released in drainages of Grays Harbor to determine the differential in harvest between the river systems. Marked coho were released, also, above and below suspected environmental "blocks" in the Grays Harbor Estuary to measure how the blocks affect fish emigration through such areas.

Washington 1-29-R | Ray C. Johnson | Completed 1967

Early marine life history - chum and pink salmon - Visual observations, beach seine, and traps were used to obtain information on distribution and abundance of pink and chum salmon fry in Puget Sound estuaries. A technique for mass marking of salmon fry with fluorescent dyes was investigated.

Washington 1-30-R | Earle D. Jewell | Completed 1968

Field recovery coded wire tag - This study has improved magnetic detectors for recovery of coho salmon marked by coded wire tag and developed tools and techniques to improve tag extraction. Field recovery tests have been conducted over a broad range of conditions in Puget Sound.

Washington 1-32-R | Harry Senn | $3,000

Hatchery coho salmon--contribution to the fishery - As part of a hatchery evaluation program the Washington Department of Fisheries released fin-clipped smolt coho salmon at 22 hatcheries on tributaries to Puget Sound and Columbia River. Stations participating in the evaluation program mark about 10 percent of their yearling production. Marked adult fish are recaptured at the hatchery racks by the hatchery personnel.

Washington 1-33-D | Richard E. Noble | Completed 1970

Evaluation of dry feed for hatchery salmon - Dry fish feeds formulated from raw materials, including nonfood fish and kelp, as well as byproducts from milling and other food production, were tested and evaluated for hatchery-reared salmon.

Washington 1-37-R | Peter K. Bergman | Completed 1968

Analysis and publication of coded wire tag research data - Data on retention of coded wire fish tags were processed, and the information placed on data processing cards. Analysis were performed on most aspects of the study.

Washington 1-40-R | Ray C. Johnson | Completed 1969

Larval and estuarial studies - pink and chum salmon populations - Egg and pre-emergent fry were sampled in Puget Sound streams and rivers to assess survival of chum salmon alevins to the swim-up stage. Density and abundance of the fry provided information for the prediction of the size of the adult run.

Washington 1-54-R | Ray C. Johnson | $19,000

Pink and chum salmon prediction studies - The purpose of this study is to obtain juvenile survival and abundance data to permit adequate testing of experimental techniques used to predict returns of adult pink and chum salmon. The relationship of environmental data of past years to corresponding chum salmon runs size for the purpose of prediction is evaluated.

Washington 1-55-R | Samuel G. Wright | Transferred to P.L. 89-304

Ocean salmon fisheries sampling - A comprehensive sampling program involving both permanent and temporary samplers at major coastal landing ports was established to monitor pertinent biological factors of Washington ocean salmon fisheries. Sampling included both fish landed at dockside and onboard observations during actual fishing operations at the end of the first segment.

Washington 1-72-D | Kenneth Krol | $42,200

Capital Lake fall chinook rearing program - The means of attaining the maximum fall chinook production and resultant contribution to the fishery from Capital Lake are determined. Natural rearing in the lake and artificial feeding are evaluated also.

Washington 1-73-D R.E. Noble $45,000

Hatchery dry feed field tests - This project provides for field tests of dry diets for salmon commercially prepared by different manufacturers to determine feeding parameters tested with the Oregon pellet production diet control.

Washington AFC-12 Earle D. Jewell Completed 1968

Port Susan-Port Gardner pink salmon studies - During August and September 1967, 3,201 pink salmon were marked with Petersen disc tags and released in the Puget Sound (Port Susan-Port Gardner) commercial fishery near Everett. Tags from 657 recaptures were returned. Returns are analyzed to provide information on the origin, timing, and movement of the marked fish.

Washington AFC-13 Ernest Salo Completed 1970

Measurement of spawning success and fry quality of chum salmon utilizing natural and controlled spawning areas in Big Beef Creek, Washington - A spawning channel was developed by modifying a small stream located at the University of Washington's Fisheries Research Institute station on Big Beef Creek about 2.5 miles north of Seabeck on Hood Canal in Kitsap County. It provided controlled conditions for studies of the survival rate and quality of salmon from egg deposition to emergence in areas where the ecological conditions of the spawning beds have been manipulated.

Washington AFC-14 Earle D. Jewell Completed 1970

Gill net drop out study - Objectives of the original projects were, first, to determine the rate of salmon dropout for gill nets of various sized mesh and survival of salmon that escape gill nets, and, second, to develop a net to reduce such dropout. Only the first objective was accomplished for chinook and coho salmon in the Puget Sound fishery.

Washington AFC-35 Frank Haw Completed 1970

Puget Sound resident coho study - The purpose of this study was to develop practical methods of artificially enhancing the population of coho salmon that historically has resided within Puget Sound (resident) and has thus contributed heavily to the local recreational fishery.

Washington AFC-46 Frank Haw $13,200

Puget Sound resident coho study - The purpose of this study is to build up the resident coho salmon stocks in Puget Sound by artificially rearing wild strains of fish that have historically resided within the Sound. Evidently hatchery salmon strains migrate out of the sound to sea.

Washington AFC-47 Harry Senn Completed 1970

Fall chinook contribution to the fishery - The contribution to the fishery, made by fall chinook salmon from the Skagit River hatchery, was measured through the use of marked fish released from 1969 brood year fingerlings.

Washington AFC-50 Ernest O. Salo $126,708

Big Beef Creek chum salmon spawning success and fry quality - This project is essentially a continuation of the recently completed project AFC-13 to determine optimum spawning and hatching conditions for chum salmon by use of artificial spawning channels.

Washington AFC-56 Earle D. Jewell $13,524

1971 Lake Washington sockeye tagging study - Adult Lake Washington sockeye salmon passing through Puget Sound between Discovery Bay and the Ballard Locks are investigated through tag and recovery program. Information is obtained on migration route and rate, marine gill net harvest, and timing of different spawning populations.

Wisconsin AFC-11 R.C. Lindsay $24,866

Evaluation of food-processing methods for Great Lakes anadromous fish - This project is for the development of potentially valuable commercial fishery resources through improved quality of Great Lakes salmon and for obtaining information on the chemical composition of raw and processed fish, as well as pesticide residues in fish flesh portions. The research is being done at the Department of Food Science, University of Wisconsin.

Scup:

Rhode Island 3-138-R Richard T. Sisson $14,300

Growth and movement of scup (Stenotomus chrysops) - To obtain information on movement and migratory behavior of scup marked and released in Narrangansett Bay. These data will be correlated with other State programs on this species.

Sea bass:

South Carolina 2-138-R Charles M. Cearden $7,760

A study on the black sea bass (Centropristea stratus) - Information on the black sea bass, including description of the fishery and biology and general life history of the species which is essential for development of management procedures of the resources is obtained.

Smelt:

Wisconsin AFC-10 C.R. Norden $7,874

Age, growth, and maturity of the smelt in Lake Michigan - The age, growth, and maturity of smelt populations along the Wisconsin shore are investigated to determine whether or not there geographic differences in the growth rates.

Steelhead trout:

Idaho 1-1-D Terry Holubetz Completed 1970

Experimental rearing of steelhead trout at Hayden Creek ponds, Idaho - To determine maximum stocking density for ponds under varied conditions, smolts from eggs of the spring mid-Snake River steelhead trout runs were stocked at rate of 132,000 and 240,000 per acre and reared over a 1-year period at the Hayden Creek ponds. Additional research was made on production of chinook salmon at the same facility.

Striped bass:

Alabama AFC-1 E. Wayne Shell Completed 1970

Research on striped bass in Alabama rivers - Methods of culturing fingerling striped bass for mass stocking at minimum costs were investigated at Auburn University. Fingerlings were reared on pelleted trout food and forage minnows in earthern ponds and metal troughs. About 575 of the hatchery-produced fingerlings were marked with spaghetti tags and by fin clips and released in Mobile Bay and Alabama River to study survival, growth, and migration.

Alabama AFC-3 Madison Powell $30,000

Striped bass, Roccus saxatilis, production to establish commercial stocks in Alabama estuaries - Objective of this work is to culture striped bass fry and fingerlings of a size 6 to 9 inches in brackish water habitat for release into Mobile Bay and contributory streams to rehabilitate runs of fish. Results of the stocking of fish are evaluated also.

Alabama AFC-4 E. Wayne Shell $18,000

Factors limiting the survival and growth of early life history stages of the striped bass (Roccus saxatilis) - The objective of this project is to determine factors that limit the hatchability and survival of eggs and the survival and growth of fry and fingerling striped bass under culture conditions. The work is conducted at Auburn University.

Maryland 3-27-R | Ted S.Y. Koo | Completed 1968

Tagging of juvenile striped bass, Roccus saxatilis (Walbaum) in Chesapeake Bay estuaries - Aquarium tests were made on the suitability of Carlin, dart, and straight wire tags for marking young-of-the-year striped bass. Several thousand juvenile striped bass were marked and released in upper Chesapeake Bay, C&D Canal, and Patuxent River to study migratory behavior and homing tendency.

Mississippi AFCS-1[1/] | Gorden Gunter | Completed 1970

A study of striped bass, Roccus saxatilis, in Mississippi waters - Experimental stocking of hatchery-produced fingerling striped bass was undertaken in the Pascagoula, Biloxi Bay, St. Louis, and Pearl River systems to determine whether runs can be established in these waters. Some of the released fish were marked with spaghetti tags to obtain life history information.

Mississippi AFCS-4[1/] | Thomas D. McIlwain | $70,000

Establishment of a commercial and sport striped bass fishery in coastal streams, estuaries, and open Gulf of Mexico waters - To establish populations of striped bass in Mississippi waters, advanced fingerlings reared from known migratory are stocked in coastal streams.

North Carolina AFC-1 | William W. Hassler | Completed 1970

The status, abundance, and exploitation of striped bass in the Roanoke River and Albemarle Sound, and the spawning of striped bass in the Tar River, North Carolina - About 600 striped bass were tagged and released in lower Roanoke River during the spawning season to estimate population size from catch returns. In addition, egg sampling stations were studied on the Roanoke and Tar Rivers to obtain information on the time, duration, and extent of striped bass spawning in each stream.

North Carolina AFC-4 | William D. Davies | Completed 1970

Factors affecting survival of immature striped bass - Fry and fingerling striped bass reared in hatchery ponds fed primarily on Cyclops; therefore, the effects of certain chemicals and environmental factors on zooplankton abundance were investigated. Additionally, the limits of water temperature, pH, and total dissolved solids at which immature striped bass survive were studied.

Sturgeon:

New York AFC-4 | Tom Jollef | Completed 1970

Evaluation of present and potential sturgeon fisheries of the St. Lawrence and adjacent waters - Condition, utilization, and potential of the sturgeon fisheries of the St. Lawrence River within New York and in the eastern basin of Lake Ontario were investigated. Also, information was obtained on nursery and spawning areas.

New York AFC-6 | Tom Jollef | $42,000

Abundance, distribution, growth, and mortality rates of sturgeon - The objectives are to obtain biological information on Atlantic and shovelnose sturgeons in the Hudson River and coastal Long Island Sound for more efficient management of the resource.

South Carolina AFC-1 | John G. Leland | Completed 1968

Survey of sturgeon fishery of South Carolina - Information was gathered on the freshwater life history of the sturgeon, and an inventory was made of the fisheries in coastal streams and Wyanah Bay.

[1/] Joint administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife

Others:

Alabama 2-120-R — Hugh A. Swingle — $18,000

Distribution of commercial fishes and invertebrates in the tidal rivers of Alabama - This project provides for investigation of the distribution of early life history stages of commercial fishes and abundance and distribution of marsh clams in tidal rivers of Baldwin and Mobile Counties.

California 6-7-R — Diane Robbins — Completed 1970

Food habits study of organisms of the California current system - The food habits and requirements of fishes and cephalopods that inhabit the California current system adjacent to the coast were investigated. Stomachs of albacore, bonito, hake, rockfish, and squid were collected for analysis.

Florida AFCS-5[1/] — Roy Williams — $81,500

Study of anadromous fishes in Florida - This project will survey about 31 river systems to identify the anadromous fish stocks in each river; obtain basic information on the abundance, seasonal occurrence, and potential level of exploitation; and, based on these data, develop a management plan for the resources.

Georgia 2-32-R — Charles W. Frisbie — Completed 1966

Preliminary survey of existing and potential marine resources on the Georgia Coast - The diversity of Georgia's marine finfish and shellfish resources were examined, research needs identified, and project proposals for conservation and development of commercial fisheries developed.

Louisiana 2-94-R — Fred Dunham — $20,500

A study of commercially important estuarine dependent industrial fishes - Industrial fish populations of coastal Louisiana are investigated to provide information for more effective management and to provide industry with information on how to best utilize these resources.

Maine 3-15-R — Frank W. Ricker — Completed 1970

The development of commercial fisheries estuarine resources - An inventory of marine plants and animals having potential for development of commercial fisheries in estuarine and inshore waters was completed. Availability, abundance, and growth of Irish moss were investigated also.

Mississippi 2-128-R — J.Y. Christmas — $29,051

Investigations of coastal pelagic fishes - Seasonal and areal distribution and relative abundance of the larvae, juveniles, and adult pelagic fish species are determined along the coast out to the 50-fathom curve between Mobile Bay and Chandeleur Island. Information is obtained on life history of the species present.

New Jersey 3-2-R — Ronald L. White — Completed 1968

Evaluation of the menhaden and shad fishery in Delaware Bay and adjacent waters - The purpose of this study was to determine whether food fish are taken by the menhaden fishery, if nets damage oyster bottom, whether a "lift period" regulation is desirable for the shad fishery, and if the menhaden fishery attracts sharks.

Oregon 1-46-R — James Meehan — Completed 1970

Boat charter - A 55-foot trawler was chartered on an annual basis for research on the tunas from northern Oregon coast to Cape Mendocino, Calif., and on shrimp and crabs in the coastal waters between Astoria and Newport. Albacore were tagged and released for migration studies.

[1/] Jointly administered and funded by National Marine Fisheries Service and Bureau of Sport Fisheries and Wildlife.

South Carolina 2-110-R Charles M. Bearden Completed 1971

An investigation of the offshore demersal fish resources of South Carolina - Project objectives were to accumulate and evaluate information on the species composition, distribution, availability and potentials of demersal fish population of economic significance on the Continental Shelf area off South Carolina.

South Carolina AFC-4 William Wade $45,000

Commercial anadromous fishery - Edisto River, South Carolina - A general inventory is made of the commercial anadromous fish resources of the Edisto, Savannah, Pee Dee, and Waccamaw Rivers.

Texas 2-47-R Henry W. Compton, Jr. Completed 1970

Northwestern Gulf of Mexico marine fisheries investigations - This project determined the abundance and seasonal and size distributions of shrimp in shallow waters of the Continental Shelf and of shrimp and industrial fish in depths beyond 60 fathoms off the Texas coast. Also, the life histories of red snapper and related reef fishes were studied.

Texas 2-109-R Edward Bradley $82,400

Northwestern Gulf of Mexico marine fisheries investigations - study number 2 - This work is undertaken to determine the seasonal location, population and size composition, and abundance of the commercial and potentially commercial species of reef and mid-water fish and of the commercial shrimp as related to environmental conditions in the northwestern Gulf of Mexico.

Virginia 3-5-D Jackson Davis Completed 1970

Investigation of potential for expansion of the industrial fishery of the mid-Atlantic Bight - The spatial and seasonal distribution and abundance of fish of shelf waters between Cape May, N.J., and Cape Hatteras, N.C., were determined to ascertain if any fish are sufficiently abundant to support an industrial fishery.

Wisconsin 4-58-R Ronald Poff $18,410

Lakes Michigan and Superior assessment studies - Accumulated data on lake trout and associated species assembled, compiled, and analyzed as a basis for management of the fishery stocks in Lakes Michigan and Superior.

JELLYFISH

Eleven projects have been funded, of which four have been completed. Research is concerned primarily with obtaining additional knowledge about the several life stages of the different jellyfishes and development of means of controlling abundance of these animals.

Connecticut JF-3-6-R J.S. Ramus $15,748

Studies directed toward methods for control of Codium fragile in Long Island Sound - Laboratory and field studies are conducted to determine Codium's salinity and temperature tolerances, means of growth and reproduction, time or reproduction, invasion patterns, and nature of attachment to oysters.

Florida JF-2-2-R Frank Kennedy $27,600

Survey of the distribution and abundance of the Portuguese Man-O-War in waters adjacent to Florida - This study is designed to obtain basic distribution and abundance data on the Portuguese Man-O-War. Aerial surveys are being made monthly to chart direction and movement of this species in relation to the surface water currents and to make abundance estimates. Life history information is also being obtained from specimens collected during vessel operations.

Maryland JF-3-1-R David G. Cargo Completed 1970

A study of the biology of sea nettles to develop potential methods for control of their abundance - The Chesapeake Bay Biological Laboratory conducted studies to obtain a thorough knowledge of the life history of the sea nettle, determine its relation to various environmental factors, determine the effect of this and related species on other Bay animals, and to develop methods of control.

Maryland JF-3-7-R David G. Cargo $92,000

A study of the biology of sea nettlesto develop potential methods for control of their abundance - This study is undertaken to increase our understanding of the ecology of the summer sea nettles and to evaluate means of biological and chemical controls of their abundance.

Mississippi JF-2-1-R Philip Phillips Completed 1971

Population studies of Mississippi Sound and inshore Gulf coelenterates with special emphasis on noxious planktonic forms - This project investigated the life history and related environmental factors relative to population abundance of the noxious coelenterates. The Gulf Coast Research Laboratory, Ocean Springs, analyzed biological samples and hydrographic data collected from the estuaries to the shallow offshore islands.

Mississippi JF-2-8 Carol E. King $36,350

Population studies of noxious coelenterates of Mississippi Sound - This study will expand project JF-2-1 and initiate laboratory research on the various species to gain a better understanding of the biology of these animals.

New York JF-3-3-R Kenneth Koetzner Completed 1971

A study of the overwintering and germinating stages of floating marine algae in Great South Bay, New York - The purpose of this project was to find out how to control the abundance of marine algae. Samples of the upper portion of the sediment layer and overlying water were made and analyzed in the laboratory. Changes in temperature and salinity at selected stations were recorded. Overwintering stages collected from October to April were germinated in the laboratory to determine species and growth.

New York JF-3-5-R Kenneth Koetzner $22,000

A study of the setting, attachment, and growth of codium fragile on shellfish in Long Island waters - The purpose of this study is to determine the type of attachment of Codium fragile to shellfish and to determine the factors affecting the production of these juvenile stages and the factors affecting their rate and mode of attachment.

Puerto Rico JF-2-6-R Charles Cutress $20,000

Investigation of the biology and control of noxious coelenterates occurring in the coastal waters of Puerto Rico - Little is known of the noxious marine animals in Puerto Rico. A survey is underway to determine the type, incidence, and severity of injury to bathers and the occurrence and distribution of noxious marine invertebrates. Life history studies will be made on those noxious jellyfish of primary importance.

Virginia JF-3-2-R Dexter Haven Completed 1971

An ecological study of the jellyfish (Chrysaora quinquecirrha) - Research activities were conducted in the lower Chesapeake Bay and the James, York, and Rappahannock Rivers to define the distribution and abundance of various life stages of the jellyfish. Possible predators and other causes of mortality associated with the jellyfish were investigated. The work was done at the Virginia Institute of Marine Science, Gloucester Point.

Virginia JF-3-9-R Edwin B. Joseph $133,502

Control measures for Chesapeake Bay jellyfishes - This project is a continuation of research on the biology and life stages of jellyfish and will explore control means by inhibating one of the several life stages. Also, the work will attempt clarification of the ecological role of jellyfish and assess the consequences of any promising control measure.

SHELLFISH

There have been 83 projects approved and funded under the shellfish category, of which 50 have been completed. Resources involved are clam, crab, lobster, freshwater mussel, oyster, scallop, and shrimp.

Clam:

Delaware 3-135-R — Don Maurer — $20,000

Hard-clam survey of Delware Bay - Work is conducted by University of Delaware Maine Laboratory to determine distribution, abundance, and condition of hard clams in Delaware Bay. Also, the identity and quantities of invertebrate shellfish predators and fouling organisms are investigated.

Florida 2-134-R — Mark Gadcharles — $62,000

Exploratory clam survey of estuarine and nearshore waters - The purpose is to survey existing clam populations with the R/V Venus 68-foot Chesapeake Bay soft-shell clam dredge as the main sampling device in the estuaries and to characterize and delimit those with commercial potential. A 72-foot shrimp trawler equipped with hydraulic Nantucket clam gear will be used for deep water sampling (15-45 feet).

Georgia 2-44-R — Walter Godwin — Completed 1968

Survey of a potential hard-clam fishery - A survey along the Georgia coast to determine whether a hard-clam fishery is feasible has been completed. Several types of harvesting techniques were tested.

Illinois 4-13-R — William C. Starrett — Completed 1968

Clam industry in Illinois - The Department of Conservation has completed a study to formulate a sound basis for managing the mussel industry. The work involved an inventory of the clam fisheries on the Illinois, Mississippi, and Wabash Rivers.

Louisiana 2-91-R — Johnnie W. Tarver — $25,000

A study of the clam, rangia cuneata, in Lake Pontchartrain and Lake Maurepas, Louisiana - The purpose of this study is to determine the clam shell stocks and rate of replenishment of the clam shells harvested and the factors affecting the distribution, growth, and density of the clam in Lakes Pontchartrain and Maurepas.

New Hampshire 3-31-R — William Ayer — Completed 1969

Soft-shell clam population study in Hampton-Seabrook Harbor, New Hampshire - The feasibility of limited commercial use of the soft-shell clam was investigated through studies of seeding, growth, and mortality in Hampton-Seabrook Harbor.

New York 3-11-D — Gerald Strobel and James Redman — Completed 1966

Pilot plant depuration of hard clams - A pilot plant to determine whether it is feasible to purify hard clams from moderately polluted waters of Long Island Sound has been built. Evaluations were made of various factors. These factors were salinity, turbidity, temperature flow rate, recirculation, and dissolved oxygen that affect the depuration process for the hard clam.

New York 3-68-D — Quentin R. Bennett — Completed 1968

Studies of problems involved when hard clams (Mercenaria mercenaria) in commercial quantities are subjected to the depuration process - A study of the economic feasibility of the depuration process for hard-shell clams from moderately polluted areas on Long Island Sound has been completed.

Fig. 3 - Measuring a king crab from Kodiak Island area, Alaska. Photo courtesy NMFS Auke Bay Laboratory.

Oregon 1-27-R — Paul Reed — Completed 1970

Laboratory hatching and rearing of Pacific Coast clams and oysters - The development of methods to spawn and rear several species of clams and oysters for planting was the major objective of this study. Growth was observed from spat grown in the laboratory to placement in Netarts and Yaquina Bays.

Virginia 3-77-R — Dexter Haven — Completed 1970

A study of the soft- and hard-clam resources of Virginia - The intent of this research was to evaluate the potential of establishing a soft-shell clam fishery in lower Chesapeake Bay and in the James, York, and Rappahannock Rivers. Studies were made with a hydraulic soft-shell clam dredge to determine distribution and abundance, the rate at which the dredged areas would repopulate, and the effect of dredging on the substrate.

Washington 1-42-D — Ronald Westley — Completed 1971

Subtidal hard-shell clam fisheries investigations - Underwater surveys were made to investigate the presence of clams in Puget Sound and the Strait of Juan de Fuca. Commercial quantities have been found in about half of the 41 acres surveyed. Industry, the National Marine Fisheries Service, and the State are cooperating in the development of an efficient harvesting method.

Washington 1-52-R — Herb C. Tegelberg — Completed 1971

Dungeness crab study - This project was undertaken to determine the mortality rate of soft-shelled crabs discarded at sea, to develop a method for determining crab quality, to measure crab quality for a 2-year period, and to develop methods for tagging or marking.

Crabs:

Alaska 5-10-R — Carl W. Lehman — Completed 1969

Dungeness crab research in southeastern Alaska - A tag and recovery project was conducted in Duncan Canal near Petersburg to observe growth per molt and migratory behavior of dungeness crab. Size at sexual maturity was investigated. Also, SCUBA gear was used to observe the effect that log rafting areas have on crab populations.

Alaska 5-11-R — John C. McMullen — Completed 1969

Reproduction of king crabs (Paralithodes camtschatica) in the Kodiak Island area - Spawning areas of king crab, both offshore and inshore of Kodiak Island, were delineated. Additionally, size of sexual maturity of male crabs from various areas, other life history and biological characteristics of both larval and adult crabs were observed.

Alaska 5-21-R — Carl W. Lehman — Completed 1970

Dungeness crab research - This study was undertaken to provide knowledge on the biology and life history of the southeastern dungeness crab populations for the proper management of this increasingly exploited species.

Alaska 5-22-R — Harvey T. Yoshihara — $49,900

King crab study - This study is undertaken to investigate unknown aspects of the life history, biology, and reproduction of the king crab in the Kodiak Island area.

Hawaii H-6-R — Henry M. Sakuda — Completed 1969

Management and development investigation of the Kona crab (Ranina serrata) - The extent and abundance of Kona crabs on the fishing grounds were studied. Also, methods of harvesting and development of more effective gear for harvesting the resource were investigated.

Louisiana 2-92-R — B.G. Adkins — $34,000

A study of the blue crab fishery in Louisiana - The methods for harvesting blue crab commercially, environmental factors affecting annual production, and the economic significance of the fishery are investigated.

Maryland 3-108-R — Robert L. Lippson — $40,000

Blue crab study in the Chesapeake Bay - This is a joint undertaking by Maryland Department of Chesapeake Bay Affairs and the Virginia Marine Resources Commission to determine the influence of various factors such as fishing pressure, parent stock size, and environmental phenomena on population size and distribution of blue crab.

Mississippi 2-123-R — J.Y. Christmas — $28,980

A study of the blue crab fishery in Mississippi - The life history and dynamics of the blue crab and related species are studied to determine environmental factors influencing the fluc tuations of productions. Additionally, the effects of sport-commercial fishery conflicts on the resource are investigated.

Oregon 1-5-R — Paul H. Reed — Completed 1970

Controlled rearing of dungeness crab larvae and the influence of environmental conditions on their survival - This project at Oregon State University's Marine Science Center at Newport was to develop techniques for the identification and rearing of dungeness crab larvae and to study how dissolved oxygen concentrations, temperature, and salinity affect the larvae distribution and survival of larvae. The feasibility of hatching and rearing crab larvae on a commercial basis was explored.

Rhode Island 3-43-R — Andreas Holmsen — Completed 1969

Investigation of the deep sea red crab (Geryon quinquedens) - The cost involved in handling the deep sea red crab, both on a trawler and in a processing plant, and the market characteristics of the species were investigated.

Rhode Island 3-46-R — George W. Gray, Jr. — Completed 1969

Investigation of the basic life history of the red crab - Growth, age at sexual maturity, spawning and molting seasons, migratory behavior, and natural mortality of the red crab were investigated.

Lobster:

Connecticut 3-44-R — William Lund, Jr. — Completed 1970

Investigations on the lobster - The population structure and ecology of a designated area near Ram Island were studied with the use of SCUBA gear. Routine observations were made to determine movement, behavior, and bottom type preferred by lobsters. Plankton tows were also made weekly during the spring and summer to define the period when lobster larvae were present.

Connecticut 3-130-R — William Lund, Jr. — $24,800

Ecology, population structure, and movements of lobsters - Seasonal composition and distribution of lobster populations in Long Island and Fishers Island Sounds are determined. Information is obtained also on movements, activities, and growth and frequency of molting of lobsters in the study areas.

Hawaii H-5-R — Henry Sakuda — Completed 1969

Management investigation of two species of spiny lobsters, Panulirus japonicus and P. penicillatus - Previously collected data on the spiny lobster relative to net and trap catches, migration, molting frequency, growth, and reproduction were analyzed.

Maine 3-14-R — James Thomas — Completed 1971

Lobster research program - This study was concerned with obtaining and analyzing biological and statistical data on the inshore fishery for management purposes. Catch statistics from 152 dealers located throughout the coastal counties were analyzed. Samples were also taken each month from 10 different locations along the inshore area to determine changes in length, weight, sex ratio, and maturity of the lobster.

New York 3-100-R | Investigator to be selected | $13,500

A study of burrow selection by the American lobster - The behavior of lobster in regard as to the size and shape of the burrow is investigated to obtain information for management of the resources.

Puerto Rico 2-97-R | Robert Y. Ring | $18,740

Investigations on the resource potential of the spiny lobster (Panulirus argus Latreille) in Puerto Rico - This project is undertaken to determine the condition of the lobster fishery, determine catch from various fishing grounds and explore for new fishing grounds, especially in depths beyond 20 fathoms.

Mussel:

Indiana 4-10-R | Louis A. Krumholz | Completed 1968

Mussel research study - To inventory the mussel resources, the Wabash and White Rivers have been sampled with crowfoot bar at 50 1-mile stations. Biological and life history information, such as reproductive success, age, and growth, has been obtained for evaluation of management regulations.

Kentucky 4-19-R | John C. Williams | Completed 1969

Mussel fishery investigations - The location and extent of the mussel beds, species composition, population density, harvest, recruitment, and reproduction of mussels in the Tennessee, Green, and Ohio Rivers in Kentucky were investigated. This work was done at the Murray State University Biological Station at Murray.

Ohio 4-28-R | John M. Bates | Completed 1970

Mussel fisheries investigation - Studies were made on the Muskingum, Scioto, and Little Miami Rivers in southeastern Ohio to determine the distribution of the mussel beds and to obtain biological and life history information for the species present. An estimate also was made of the annual harvest by collectors. Information obtained will provide the basis for a management program for the State's mussel resources.

Pennsylvania 3-85-R | John M. Bates | Completed 1969

Mussel investigations - The location and extent of the mussel beds, both qualitatively and quantitatively, in the Ohio River drainage, within the State were investigated. Samples were collected to obtain species composition, stage of maturity, and rates of growth. How various harvesting techniques affect the mussel beds were studied also.

Tennessee 4-46-R | Paul Yokley, Jr. | $18,000

Freshwater mussel ecology, Kentucky Lake, Tennessee - This study is designed to evaluate the types of habitat of established mussel beds and to determine the density and species composition of each site. Mussels will be tagged, and the shell erosion, age range, number of species, and their density will be correlated with the water quality and bottom type of the area.

West Virginia 3-97-R | John M. Bates | Completed 1971

Mussel investigations - This was a coordinated study with Ohio and Pennsylvania to determine the distribution and extent of mussel beds within the Ohio drainages of the respective States. Also, other pertinent life history information such as rate of recruitment, rate of growth, age composition, and reproduction success were investigated.

Oyster:

Alabama 2-18-R | Edwin May | Completed 1968

Oyster raft production - A low-cost raft and cultch material was designed, and research on spat growth related to a changing environment concluded.

Alabama 2-30-D George Allen Completed 1967

Shell planting for oyster cultch - An area in Mobile Bay on Point Clear Reef was selected and planted with about 37,309 barrels of shell. A substantial supply of seed oysters resulted from this planting.

Delaware 3-8-D Ted Ritchie Completed 1966

Rehabilitation of the natural seed oyster beds in Delaware - The planting of 219,184 bushels of shell has been completed to develop and enlarge several small natural seed oyster beds. A successful spatfall was recorded at each area.

Delaware 3-98-D Ted Ritchie $3,600

An experimental planting of seed oysters in Delaware Bay - The primary objective of this project is to determine the feasibility of planting seed oysters in Delaware Bay. Primary objectives include the determination of growth and survival rates and evaluation of commercial oyster production potential.

Delaware 3-142-R Robert A. Beck $18,000

Live oyster bed and cultch survey of the Delaware Bay and tributaries - This project will locate, map, and mark the distribution of living oyster beds and cultch in the Delaware Bay and its tributaries. Concurrently, samples of the oyster cultch, plus spot production, will be taken to determine condition of the resource.

Florida 2-52-D Robert Ingle Completed 1971

Construction of artificial oyster reefs - Natural oyster reefs were established from Tampa Bay north to Choctawhatchee Bay. This project will create permanent areas for oyster attachment and growth, and, consequently, commercial production.

Georgia 2-10-R Thomas Linton Completed 1968

Feasibility study of methods for improving oyster production in Georgia - An inventory of the intertidal resources has been completed. Pilot studies to find the best methods of cultivation are completed on pond and raft culture.

Hawaii H-2-R Henry Sakuda Completed 1969

Investigation for the development of a commercial oyster industry - Seed oysters were collected from West Loch, Pearl Harbor, Oahu, and transplanted into Hilo Bay on the island of Hawaii, Kaneohe Bay on the Island of Oahe, and other selected ponds and estuarine areas. The oysters are sampled routinely for changes in condition, growth, and mortality.

Hawaii H-13-D Henry Sakuda $17,533

Commercial oyster fishery development investigation - The purpose of this study is to conduct experimental commercial-size oyster-growing operations with adult, seed, and spat (very young) oysters and investigate methods of producing oysters in commercial quality and quantity for experimental marketing studies for the purpose of developing a commercial oyster fishery.

Louisiana 2-23-D John Loy, Sr. Completed 1970

Oyster lease control monuments - Survey control monuments were established throughout the oyster-growing areas to aid in accurate surveys of waterbottoms for leasing purposes. The control monuments were constructed of concrete and reinforcing steel rods and placed at about ½-mile intervals.

Louisiana 2-24-D Max Summers Completed 1966

Shell planting for oyster cultch - This shell-planting project was an overall effort to provide additional shells on selected areas within the oyster seed grounds in Bay Boudreaux and Black Bay.

Louisiana 2-54-D Max Summers Completed 1967

Shell planting for oyster cultch - This project provided cultch material for planting on Half Moon area and Black Bay, which are oyster seed grounds east of the Mississippi River. About 33,300 cubic yards of clam shell were planted.

Louisiana 2-72-R Charles J. White $2,500

Evaluation of experimental oyster-tonging reefs in Calcasieu Lake - The purpose of this project is to evaluate the development of oyster-tonging reefs in Calcasieu Lake. About 10,000 to 15,000 cubic yards of clam shell will be planted at predetermined locations. The shell planted will form a mat of about 4 inches in depth. Monthly checks will be made to determine the success of spatfall.

Louisiana 2-90-R J.F. Pollard $35,000

Experiments to reestablish historical oyster seed grounds and to control the Southern oyster drill - The purpose of this study is to test various materials to determine which is best suited for use as cultch and to determine through cultch plantings which areas are suitable for reestablishing pre-existing oyster seed grounds.

Louisiana 2-114-D W.S. Perret $220,000

Clam-shell planting for oyster cultch - Approximately 56,000 cubic yards of clam shell are being planted on 250 acres of bottom in the Caillou oyster seed reservation to provide additional and supplemental cultch material for catching oyster spat and growing seed oysters.

Louisiana 2-118-D J.W. Lay $93,000

Control monuments for oyster leases - The objective of this project is to establish control monuments throughout the oyster growing areas along the coast at ½-mile spacings on land areas from which surveys of water bottom for oyster leases can be coordinated and identified.

Maryland 3-29-R Donald Pritchard Completed 1967

Studies of the physical processes of movement and dispersion of oyster larvae - The major effort of this study was directed toward analysis of the data derived from earlier attempts to use a tracer fluorescent dye to simulate the movement and spread of oyster larvae, and to use this analysis in the design of a field study. The area chosen for the field study was the Manokin River estuary.

New Hampshire 3-32-R William Ayer Completed 1969

An investigation of the possibility of seed oyster production in Great Bay, New Hampshire - Population estimates were made in selected areas of Great Bay by SCUBA divers. Life history studies on the seed oysters defined the time of spawning, survival, and growth.

New Jersey 3-1-D Christopher Riley Completed 1970

Shell-planting program Maurice River Cove (Delaware Bay) and Mullica River (Atlantic Coast) - Oyster shells to serve as cultch were planted on selected beds in the Delaware Bay and Mullica River. Over two million bushels of shells were planted to enlarge and rehabilitate seven beds in Delaware Bay and the Mullica River.

New Jersey 3-3-R Harold Haskin $50,000

Disease-resistant oyster program - Delaware Bay - This project is a continuing study to provide basic knowledge for consistent production of a disease-resistant stock of oyster seed and to increase the yield of marketable oysters from such seed through control of various causes of mortality. These objectives are being approached by experimental testing of disease resistance in the field, experimental approach to control predators, use of lower Delaware Bay spat as seed oysters, and artificial rearing of disease-resistant strains of oysters at the Cape Shore Laboratory.

New Jersey 3-120-D — Harold H. Haskin — $100,000

Shell-planting program - Seed oysters are moved from Mullica River seed beds to the market oyster beds downstream where they will grow within 2 years to market size. The seed beds were developed by planting of shells under project number 3-1-D.

North Carolina 2-6-R — Howard Marshall — Completed 1969

Oyster studies - Cultch materials were placed in Shallottee River, Lockwoods Folly River, New River, Back Bay, and Deep Bay, and their time of placement was studied in relation to the success of oyster spat. Data on spat abundance, water temperature, salinity, and tidal cycle were also collected.

South Carolina 2-2-R — Robert Lunz — Completed 1969

Charting of subtidal oyster beds and experimental transplanting of seed oysters thereto from polluted seed oyster beds - Oysters from the Wando and Santee Rivers that are subjected to several types of pollution were moved to unpolluted areas for natural depuration. Samples were taken routinely to study growth, condition, and survival of the oysters transplanted into the new habitat.

South Carolina 2-69-R — Robert Lunz — Completed 1969

Investigation into the supplemental feeding of oysters - In an effort to open new areas of increased productivity of new methods of cultivation, this study investigated the value of supplementary feeding of oysters. Different food substances such as molasses, rice chaff, and starch were used to discover a low-cost, readily available product that would produce rapid weight increases and/or growth. This work was carried out in temperature-controlled, 3,000-gallon capacity concrete tanks at Bears Bluff Laboratories on Wadmalaw Island.

South Carolina 2-105-R — Robert C. Grady — $35,000

Survey of the South Carolina oyster fishery - This project provides for an inventory and survey of the State's commercial oyster fishery to provide information that can be used to formulate recommendations for fish legislation and regulation.

Virginia 3-7-R — William Hargis, Jr. — Completed 1966

Investigations of oyster larvae and spat and certain important environmental factors in an horizontally stratified estuary - The movement and dispersion of oyster larvae and spat have been examined in relation to physical factors such as salinity, density gradients, current direction and velocity, light, temperature, and oxygen. A model of the James River System was used to determine the rate of movement and dispersion.

Virginia 3-118-D — VIMS Staff — $100,000

Shell planting program - Objectives of this project are to plant oyster shell cultch in several public oyster growing areas so as to provide an adequate spatfall collecting medium and to obtain from this spatfall a supply of seed oysters which can be transplanted to rehabilitate the oysters in depleted public oyster grounds.

Washington 1-24-D — Cedric Lindsay — Completed 1967

Inspection of oyster seed - new Asiatic sources - Because of the continuing decline of imports of oyster seed from Japan on which the industry depends, a trip was made to Korea and Taiwan to investigate new sources of seed. Oysters were tested for predators and disease to guard against infestation of Pacific oyster grounds. A new oyster seed source that was found in Korea was acceptable under the standards required by the State. The seed sources in Taiwan were not acceptable.

Washington 1-31-R | Clyde Sayce | Completed 1968

Willapa oyster studies - The growth and fatness of Pacific oysters were studied at the Shellfish Laboratory, Nahcotta. Supplemental feeding with starch and materials containing starch, such a powdered milk and egg products, and fish protein concentrate was provided to determine how it affected the fatness and pumping rate of the Pacific oyster. Hydrographic factors that directly affect the retention of oyster larvae to setting size were defined to provide the industry with improved prediction of commercial spatfall.

Scallop:

Alaska 5-13-D | Gary Finger | Completed 1968

Commercial feasibility of Alaska scallop fishery - This project has provided the State with the basic data on abundance and distribution that are needed for management regulations on sea scallop resources in southcentral coastal areas of Alaska. This project has stimulated a new scallop industry at Seward.

Alaska 5-23-R | Daniel P. Hennick | $25,600

Sea scallop investigations - The objectives of this project are to determine the relative abundance and location of commercially important scallop stocks in coastal areas, to investigate the basic biology of the sea scallop, and to assess damage done to associated species, such as crabs, by scallop dredging.

Rhode Island 3-113-R | Howard Russell | $16,100

An experimental seed bay scallop stocking of selected Rhode Island waters - The objectives of this study are to observe rates of growth and predation on bay scallops in certain areas of Rhode Island which have, in the past, produced scallops in large quantities, in order to assess their future production potential. The view is toward a restoration of a viable bay scallop fishery in Rhode Island.

Shrimp:

Alaska 5-20-R | Jerry McCrary | $51,500

Pandalid shrimp studies - Data are collected for detailed description of the life histories of the pink shrimp, sidestripe shrimp, coonstripe shrimp, hump shrimp, and other species if feasible in the Kodiak-eastern Alaska regions. Seasonal geographic distributions, migration pattern, and variations in abundance of these shrimp are investigated also.

Georgia 2-43-R | Charles M. Frisbie | Completed 1969

Seasonal abundance and biological stability of the commercial shrimp of Georgia - Sampling stations were located offshore in sound, rivers, and in marshes throughout the shrimps' habitat. Trawl, seine, and plankton net collected adults, postlarval, and larval shrimp throughout the year. Determinations were made on relative and seasonal abundance, growth rate, sex ratio, spawning success, and limiting environmental factors of shrimp.

Georgia 2-87-R | Clifford J. Knowlton | Completed 1971

Preliminary studies of a potential finfish industry from commercial shrimp landings - The purpose of this study was to determine the species composition and marketable size of finfish in commercial shrimp catches and their relative abundance during the commercial shrimping season.

Louisiana 2-21-R | J.G. Broom | Completed 1968

Coastwide study of penaeid shrimp - The life history of the commercial important species of penaeid shrimp in estuary waters was studied to provide information for improved management of these resources including a coordinated effort through the Gulf States Marine Fisheries Commission.

Fig. 4 - Marking shrimp with biological stain to study migratory behavior, North Carolina coast. Photo courtesy North Carolina Division of Commercial and Sports Fisheries.

Louisiana 2-93-R | Wilson J. Gaidry | $57,000

Investigations of commercially important penaeid shrimp in Louisiana's estuaries - Causes of seasonal fluctuations and abundance in shrimp populations in the estuaries are studied to determine how changes in the estuarine environment affect annual and continued production.

Maine 3-12-R | Ronald G. Rinaldo | Completed 1970

Northern shrimp - biological and technical research - Studies were made on waters adjacent to the Maine coast to determine the relative abundance of species of northern shrimp, particularly Pandalus borealis, and life history and seasonal availability of the several species. Technical problems associated with economical and efficient harvesting and marketing these species were also investigated.

Maine 3-117-R | Ronald G. Rinaldo | $33,000

Northern shrimp - assessment of some population parameters - This project is designed to establish shrimp population parameters by sampling and enhancing the collection, catch, and data from survey cruises.

Mississippi 2-124-R | J.Y. Christmas | $28,648

Investigation of commercial important penaeid shrimp in Mississippi estuaries - Under this project a study is made of the environmental requirements and relationships of penaeid shrimp with special reference to variations in commercial catch in an attempt to improve predictions of the availability of shrimp to the fishery.

North Carolina 2-26-R | Edward G. McCoy | Completed 1969

Shrimp studies - Information was obtained on population dynamics, including migratory behavior, for pink, brown, and white shrimp marked with biological stains and fluorescent pigments and released in nursery areas tributary to Core Sound and Lower Cape Fear River estuaries. A combined total of 26,989 shrimps were marked and released, of which 1,671 or 6.2 percent were recaptured. Mark and recapture studies on brown shrimp were conducted in Pamlico Sound and Bogue Sound estuaries, including Newport River.

North Carolina 2-129 R | Edward G. McCoy | $32,000

Studies of commercial penaeid shrimp - This study is undertaken to determine the effect on the resulting commercial catch when pre-commercial-size pink shrimp are harvested and discarded while fishing for commercial-size brown shrimp.

Oregon 1-3-R | Gary Milburn | Completed 1970

Study on the distribution and abundance of pink shrimp, Pandalus jordani, in the Pacific Ocean off Oregon - Sampling of commercial pink shrimp landings at Warrenton, Newport, and Coos Bay has been completed. Length-frequency, catch, and effort data by area of catch were reported. The vertical distribution and migratory behavior of this species by diel, lunar, and seasonal periods, and the environmental factors which may influence these movements were investigated off the Oregon coast near Astoria and Newport.

Oregon 1-62-R | Robert Loeffel | $28,500

An evaluation of methods for determining movements of shrimp - This study is twofold: (1) to evaluate the feasibility of various techniques of determining the movements of Pacific pink shrimp, and (2) to develop holding and rearing techniques of pink shrimp in aquaria.

Texas 2-132-R | Gary M. Stokes | $24,644

The population and distribution of penaeid shrimp in Lower Laguna Madre - The purpose of this study is to determine the population and distribution of juvenile penaeid shrimp in Lower Laguna Madre and its watershed with relation to ecological factors, and conduct a brief survey of the bait shrimp fishery in the Lower Laguna Madre in preparation for furture studies dealing with the relationship between juvenile production in the Lower Laguna Madre, the bait fishery, and commercial production in the Gulf of Mexico.

Others:

New York 3-116-D — Staff — $17,000

Shellfish sanitation control - The objective of this project is to permit on-scene microbiological examination of shellfish and water samples, thus avoiding the hazards of interpreting results from samples which have been in refrigerated storage for even a few hours.

Rhode Island 3-57-R — Saul B. Saila — Completed 1967

Mollusk environmental modification and control studies - The State terminated this study during the first year.

Texas 2-55-R — B.D. King — Completed 1970

Study of migratory patterns of fish and shellfish through a natural pass - A series of nets were fished in Cedar Bayou Pass to investigate the abundance of larval and postlarval shellfish and fish that move from the Gulf of Mexico into the coastal bays and estuaries.

FISH CULTURE

Thirty-nine projects, of which 7 have been completed, have been approved and funded. The research involves the culture of freshwater and marine finfish, as well as several species of shellfish.

Alabama 2-86-R — Walter M. Tatum — $25,000

Experiments in the culture of marine species in floating baskets - The purpose of this project is to experiment with floating basket culture of marine finfish, particularly pompano in estuarine areas. Experimental procedures for raising finfish will include the use of oysters and shrimp as biofactors to improve water quality and provide additional harvest.

Arkansas 4-49-R — Richard A. Collins — Completed 1970

Rearing single and multiple species populations of catfish in cages - The application of cage-rearing techniques to large reservoir lakes and smaller private lakes was the purpose of this study. Channel and blue catfish were stocked in the same cage and in individual cages to determine growth, oxygen levels, food conversion, andbehavior of mixed populations. State College of Arkansas made this study at Lake Beaverfork. After the first year the work was redesigned under project 4-67-D.

Arkansas 4-67-D — Richard A. Collins — Completed 1971

Cage culture of fish in reservoirs - Four different designs of cages varying in depth and surface area were planted with uniformly graded fingerling catfish to determine the effect of grading of differential growth within a cage.

Arkansas 2-133-R — Richard Collins — $5,400

Culturing of trout in cages - About 5,100 fingerling rainbow trout will be stocked in cages in a warm-water reservoir during fall, winter and spring months to determine rate of growth and feed conversion.

Arkansas 2-146-R — Richard Collins — $14,000

Efficacy of prophylactic treatments on caged catfish and investigation of cage construction materials - This project is undertaken to explore the feasibility of prophylactic treatments, including formalin dips and others in culture of channel catfish commercially in cages.

California 6-4-R — H.G. Orcutt — $87,800

Shellfish laboratory operations - This project provides for research on development of mass culture methods for abalone, clams, crab, oysters, and shrimp.

Colorado 6-11-D — Stephen A. Flickinger — $26,800

Culture of fishes with commercial importance - The objectives of this study are to explore cultural methods for the propagation of bait fish and to investigate hormonal sex control to enhance bait fish culture.

Florida 2-113-R Carlton Rowell $30,000

Development of specialized mariculture techniques on species of high potential - Methods for spawning and rearing brackish-fresh water shrimp, Florida pompano, and gafftopsail catfish are investigated at Florida Department of Natural Resource's Marine Research Laboratory, St. Petersburg.

Georgia 2-84-R James W. Andrews $35,000

A study of the nutritional, physiological, and economical requirements for the production of channel catfish in an intensive running water culture - This study at Skidway Institute of Oceanography, University of Georgia, is designed to evaluate the interactions of environmental and dieting factors on growth, health, body composition, and economic aspects of channel catfish production. Environmental variables will include water flow, aeration, stocking rates, water temperature, and light conditions. An attempt will be made to estimate the dietary requirements of various nutrients in this type of production.

Georgia 2-117-R Robert R. Stickney $10,000

Catfish fingerling production under intensive running water conditions - The purpose of this project is to determine optimal stocking density in intensive culture conditions in order to obtain optimal growth from fry to fingerling size and to update present catfish spawning methods to coincide with the needs of the intensive cultural methods.

Hawaii H-1-D Takuji Fujimuru Completed 1969

Development of a prawn fishery - Laboratory findings indicated that the prawn, Macrobrachium rosenbergi, can be held successfully for an indefinite period in tanks. The species will reproduce in captivity, and the larval stages can survive in the laboratory. The selection, introduction, and establishment of prawns suitable for mass culture and the development of culturing techniques that will lead to a commercial prawn-raising industry was investigated. The research was at the Keehi Fishery Station, Division of Fish and Game, Honolulu.

Hawaii H-14-D Takuji Fujimuru $45,127

Development of a prawn culture industry - The purpose of this project is to develop practical means for commercial culture of the giant fresh-water prawn through modification of facilities and techniques used heretofore. Formulation of effective and economical prawn foods is undertaken also.

Idaho 1-57-D Delbert Ledington $23,685

Test rearing of anadromous fish, Lemhi River drainage - The feasibility of pond rearing spring chinook salmon and summer steelhead trout to release size in the same facility utilizing controlled water temperature in 1 year is evaluated at the Hayden Creek rearing station on Lemhi River.

Illinois 4-32-R William M. Lewis Completed 1969

Feeding-out catfish in cages - The Southern Illinois University conducted this project to determine the feasibility of stocking yearling channel catfish in cages in infertile lakes such as stripmine lakes and producing marketable size fish by feeding them daily.

Illinois 4-33-R William M. Lewis Completed 1969

Investigation of problems associated with the confinement of warm-water fishes in holding tanks - The purposes of this study were to determine whether oxygen levels affect the occurrence of epizootics of pathogens in holding tanks and whether temperature manipulation may control the epizootics. Fisheries Research Laboratory of Southern Illinois University, Carbondale, did this work.

Illinois 4-51-R — William M. Lewis — $11,880

Considerations in the commercial production of channel catfish in cages - Channel catfish are reared in cages anchored in ponds at Southern Illinois University to determine the carrying capacity of different size ponds, optimum number of fish per cubic yard, optimum cage depth, value of mechanical aeration, and variations in fish growth.

New Mexico 6-20-R — John W. Hernandez — $23,000

Vertical raceways and water re-use as a means of maximizing commercial trout production - The purpose of this project is to determine if vertical raceways, effluent purification, and re-use of effluent treated water will increase rainbow trout production in hatcheries at an acceptable cost benefit level versus common trout pond culture.

New York 3-63 R — Arthur Brand — $37,000

Pond culture of oyster seed in a controlled natural environment - Oyster Pond, in East Hampton, Long Island, is the center of this study. Samples on a semiweekly basis are collected and analyzed to determine the biological, physical, and chemical characteristics of the pond. Data on intensity of spawning, setting, and survival are also obtained from spat set on hard bottom areas and rafts.

New York 3-101-R — Robert C. Batson — $8,182

A study of bay scallop growth during fall, winter, and spring in heated salt water - The objective is to determine the usefulness of heated discharge water from power stations and desalination plants in promoting bay scallop growth.

North Dakota 4-71-R — James Reilly — $3,000

Cage culture of black bullhead - This project is undertaken at the State-owned Spiritwood Lake fish hatchery to determine the growth rate of black bullhead produced on a commercial diet and the feasibility of the commercial production of the species by cage culture.

Ohio 4-68-R — Wilbur M. Tidd — $15,000

Detection of Myxosoma cerebralis spores in trout holding facilities - The purpose of this study is to develop an accurate method for detecting spores of Myxosoma cerebralis in holding facilities of rainbow trout and to determine concentrations necessary to transmit the disease. Effects of water temperature and water chemistry on spore development will be investigated also.

Oregon 1-60-R — Wallace F. Hublou — $19,000

Clam-oyster-abalone larval rearing - The purpose is to develop techniques for mass culturing clams, oysters, and abalone to assess the feasibility of artificial propagation as a supplement to natural production.

Oregon 1-66-R — C. Dale Snow — $15,500

Crab larval rearing - To develop techniques for rearing dungeness crab larvae in mass culture. Crab larvae will be challenged to different current velocities and beight intensity to gain information for development of techniques for sampling larvae at sea.

Oregon AFC-43 — Louis Bowen — Completed 1970

Pink and chum salmon culture - This project was carried out by the Oregon State University and provided for completion of an experimental field station located on Netarts Bay. The station will be used for testing a hatchery concept for increasing production for chum, chinook, and coho salmon in small coastal streams as a water source which is insufficient for natural spawning channels.

Oregon AFC-55 William J. McNeil $10,000

Culture of salmon acclimated to sea water - The project is research on new techniques for the artificial culture of salmon at Oregon State University's Marine Science Center, Newport. It includes pilot production of juvenile salmon for direct release into marine waters, testing or prototype hatchery system for producing salmon acclimated to sea water, hybridization of salmon to obtain fish which adjust readily to sea water as fry, and other related studies.

Pennsylvania 3-110-R Arthur Bradford $42,500

A study of the production of warmwater fish species in a vertical fish rearing facility - Purpose of this study is to investigate the feasibility of rearing warmwater fish in a vertical rearing unit (silo) with special emphasis on channel catfish.

Pennsylvania 3-112-R Shyrl Hood $51,000

Rearing trout in silos arranged in series - The purpose of this study is to design a series of silos which will have suitable conditions for increasing the production of trout per unit of flow.

South Carolina 2-3-R G. Robert Lunz Completed 1969

To manage and practice aquaculture in shrimp farm ponds and in large tanks under controlled conditions - Experiments at Bears Bluff Laboratory, Wadmalaw Island, beginning in 1947 and shown that it is possible to culture shirmp from postlarval stages to mature adults in shallow ponds constructed in saltwater marsh. Under this project, shrimp culture was continued in 3,000-gallon tanks in which the environment can be controlled. Attempts were made to hatch brown shrimp eggs and rear them through the larval stages.

Texas 2-78-R William R. More $79,404

Saltwater pond research - This project will use 21 ponds constructed at the saltwater pond experiment station near Palacios under project 2-14-C to develop and expand mariculture practice and procedures. A variety of fish and shellfish will be reared under various artificial ecological conditions. Chemical and physical factors will be measured to determine the effects on growth and survival of the different species.

Tenneseee 2-144-R Harold Hurst $13,320

Production of channel catfish in cages - Cages are stocked with various numbers of 5-inch channel catfish fingerlings with daily feedings of some lots of complete floating feed, and others are fed with " trout pellets for varying number of days to determine optimum production conditions. The effects of repeated noises and other disturbances on growth rate of the caged fish are observed also.

FISH DISEASE

Fifteen projects, of which 8 have been completed, have been approved to study parasites and fish diseases in both finfish and shellfish.

Delaware 3-49-R Dan Maurer Completed 1970

Pilot studies of the spawning and rearing of MSX-resistant oysters - Research was continued to spawn and rear disease-resistant oysters for large-scale plantings. Five stocks presumed MSX-"resistant" and six stocks MSX-"susceptible" were used in the laboratory experiments.

Maryland 3-20-R Victor Sprague Completed 1968

Development of a disease-resistant oyster brood stock - Various strains of oysters were tested for a relative resistance to diseases. Laboratory and field studies have been made to develop a resistant brood stock. The stocks were tested in pond culture experiments.

Maryland 3-75-R | Fred Sieling | Completed 1971

Development of disease-resistant oysters (C. virginica) under field conditions in lower Chesapeake Bay - The level of MSX incidence in oysters on natural bars in the Manokin River were studied. Spat from disease resistant brood stocks were used to repopulate areas where heavy mortalities occur.

Maryland 3-131-R | Fred Sieling | $29,750

Molluscan mortality studies - To determine prevalence and infection intensities of parasites and diseases affecting the oyster resources and other molluscan species in Chesapeake Bay and tributaries.

Michigan AFC-7 | L.N. Allison | Completed 1970

Parasites, diseases, and disease control of Great Lakes anadromous and commercial fish - This project was a part of a large research program on fish parasites and fish diseases at Michigan's State Fish Pathology Laboratory at Grayling. It was a study of red worm of yellow perch and of bacteria associated with seasonal mortality of the alewife.

Michigan AFC-9 | L.N. Allison | $70,000

Parasites and diseases of anadromous and commercial fish - This project is undertaken at the State's Fish Pathology Laboratory at Grayling to develop and evaluate diagnostic and clinical techniques to be applied by fish managers with emphasis on hatchery problems.

Mississippi 2-28-R | David Cook | Completed 1969

A study of coliform bacteria and Escherichia coli on polluted and unpolluted oyster bottoms of Mississippi and a study of depuration by rebedding - Bacteriological analyses were made routinely of selected areas in Mississippi Sound to determine their sanitary quality. As suitable locations were found, oysters from polluted areas were moved into the area to define the length of time required for depuration.

Mississippi 2-85-R | David Cook | $43,800

A study of the parasites and diseases of fish, mollusk, and curstacea utilized in mariculture - This study would be made by the Gulf Coast Research Laboratory to study and identify the parasites and diseases of marine species that are of potential value in mariculture, to determine the condition under which these parasites and diseases exist, and to seek effective methods of control of the parasites and diseases of marine species under conditions of mariculture.

Missouri 4-66-R | Robert C. Summerfelt | $4,313

Transmission of an ovary parasite of the golden shiner - This work is carried out at the Ozark Fisheries, Stoutland, to make the following determinations concerning the transmission of protozoan in golden shiner: if transmission per se is feasible; if transmission results from spore attachment to the egg membrane; if hereditary (intra-ovum) transmission is possible.

Missouri 2-131-D | Gary Comenisch | $6,000

Equipping fish disease laboratory - Equipment will be provided for a fish disease diagnostic laboratory so that it will be possible to control or eradicate such problems in State and commercial hatcheries.

Ohio 4-47-R | William M. Tidd | Completed 1970

The status of whirling disease in Ohio waters - The extent to which whirling disease exists in Ohio salmonids in private and public waters, presence of spores, and by what methods the disease is transmitted were investigated.

Tennessee 4-72-R | W.A. Rogers | $9,970

Investigations of parasites and diseases of cultured fish - This project provides for laboratory experiments under different water qualities, such as hardness, temperature, pH, and turbidity, to test the efficacy of various chemicals that are effective pathogen controls. The work is being done at Auburn University, Auburn, Alabama.

Tennessee 2-151-R W.A. Rogers $6,667

Studies on channel catfish virus disease - To determine if channel catfish brood stock are carriers of viable virus and, if so, whether or not the virus is shed in execretatory products or pass to the off-spring via sex products.

Virginia 3-6-R Jay Andrews Completed 1970

Production of disease-resistant oysters - Efforts to breed oysters and speed development of populations resistant to MSX still offer the best hope of returning infested areas to useful production. This goal is being accomplished by testing stocks of oysters for disease resistance, breeding potentially disease-resistant oysters, determining disease agents, and continuing the selection and concentration of potentially disease-resistant stocks. The research was along these lines in waters adjacent to the Virginia Institute of Marine Science, Gloucester Point.

Virginia 3-62-D Charles Bagnell Completed 1969

Propagation of disease-resistant oysters - The purpose of this project was to provide cultch on which spat could set in areas where MSX is known to be present. Work was in the waters of the Piankatank and Rappahannock Rivers and Mobjack Bay. About 1,002,714 bushels of cultch material were planted. The brood stock was not affected by the MSX disease; the researchers expect that the resultant larvae will also be disease resistant.

Virginia 3-127-R Jay A. Andrews $23,750

Testing of disease-resistant oysters - This project will study the selecting and testing of resistant stocks by mass selection and progeny-testing techniques. Studies to separate genetic and acquired resistance and evaluate their relative importance. Monitoring of seed areas for level of resistance to MSX and exploring the manipulation of seed and brood stocks to avoid losses to MSX and other mortality agents will be investigated also.

Washington 1-43-R Ronald Westley Completed 1971

Oyster drill (Ocinebra japonica) control - The behavior patterns of Japanese oyster drills and egg cases, and control measures were the main purposes of this study at the Point Whitney Shellfish Laboratory, Brinnon. Investigations in the laboratory and in the field indicate that the male drills are attracted to a water-borne substance released by the female. Further work defined this substance. The testing of chemicals to control the drill is continuing.

STATISTICS

Nineteen projects have been approved and funded under this section of the Federal Aid Program. These projects will provide the States with data to evaluate effectively their natural resources.

Alaska 5-3-D Barbara Hill Completed 1969

Expansion of current and development of additional commercial fisheries catch, production, and gear statistics - This study was undertaken to increase the accuracy and reliability of current statistics and to compile and publish fishery statistics on an area and individual fishery basis, rather than on the regional or Statewide basis.

Alaska 5-16-D Gary Ball $16,700

Expansion of current and development of additional commercial fisheries catches, production, and gear statistics - This project is undertaken to expand collection, compilation, and publication of commercial fishery statistics needed for management of the resources. This involves detailed complete and accurate catch, production, and gear statistics for use by private, State, Federal, and international agencies.

American Samoa H-18-D — Stanley N. Swerdloff — $5,000

Statistical analysis of American Samoa's fisheries - Data are collected from the longline fishery for the Honolulu Biological Laboratory of National Marine Fisheries Service, catch reporting system is implemented for the subsistence fishery in conjunction with a village fishery training program, and the local fisheries are monitored under this project.

California 6-6-D — H.G. Orcutt — Completed 1969

Port sampling - Crescent City, Brookings, Port Orford - This project was undertaken to sample three distinct fisheries--crab, shrimp, and bottomfish--for landings and to collect and analyze biological data. The observations and data were used to determine changes in abundance, size, and age composition or stock status that are prerequisite to effective management of these resources. Catches were sampled in Crescent City, and in the Brookings and Port Orford, Oregon, areas.

California 6-8-D — H.G. Orcutt — Completed 1970

California shellfish and bottomfish data analysis - The purposes of this project were to evaluate management policy and methods and develop a management plan for the crab, shrimp, and bottomfish resources. Catch and effort data and cruise information were compiled, machine processed, programmed for computer analysis, and published. The work was at the California Department of Fish and Game Marine Resources Operations Laboratory at Menlo Park.

California 6-12-D — Richard F.G. Heimann — $81,600

Shellfish and bottomfish data analysis - Catch and effort data and research cruise information for crab, shrimp, and bottomfish resources are complied, machine processed, programmed for computer analysis, and published.

Indiana 4-16-R — Carryl Christensen — Completed 1968

Inland waters commercial fisheries studies - Studies were completed on the Wabash and White Rivers to evaluate the efficiency, extent, and harvest by commercial fisheries.

Massachusetts 3-37-D — Allen E. Peterson, Jr. — $21,300

Collection, compilation, evaluation, and dissemination of commercial fisheries statistics - This project provides for new and improved statistics on lobster, alewife, and shellfish fisheries. The landing statistics, including location, catch, effort, and gear for alewife and shellfish, are collected from licensed Massachusetts fishermen and otter trawlers. Statistics are compiled, evaluated, and disseminated in monthly bulletins in cooperation with the National Marine Fisheries Service.

Missouri 4-3-R — John W. Robinson — $24,000

Research and management of commercial fisheries - This project is carried out on the Mississippi and Missouri Rivers in Missouri to improve the accuracy of commercial fish landings. In addition, the commercial catches are sampled throughout the season for species taken and for size composition of the catch.

New York 3-139-D — Investigator to be selected — $33,250

Commercial fishery statistical program for the State of New York - Commercial fishery findings will be collected for the otter trawl at Greensport, Montank and Hampton Bays on Long Island Sound and for the ocean seine fishery on the south shore of Long Island. Additionally, biological data will be collected from fish landed. Major species of interest include flounder, scup, hake, striped bass, weakfish, and bluefish.

Oklahoma 4-25-D | Gary Mensinger | Completed 1969

Commercial fishery statistics - Under this project, landing statistics on all marketable and nonmarketable fish taken by commercial gear were compiled. Some information was obtained on the number of each species taken and the size composition of the catch. The Texoma, Eufaula, Ft. Gibson, Grand, and Hudson Reservoirs were of prime interest.

Oregon 1-61-R | Wallace Hublou | $38,500

Data analysis - Dover sole stocks - Provides for completion of data analysis and submission of reports for publication on Dover sole population dynamics. Also results of survey of Dover sole stocks in deep coastal waters will be distributed.

Oregon AFC-51 | Louis Fredel | $56,000

Salmon and steelhead mark processing center for Pacific Coast States - Provides for regional center for processing data obtained from sampling catches and hatchery returns of salmon and steelhead trout and for distribution of landing statistics.

Puerto Rico 2-56-R | Rolf Juhl | Completed 1971

Fisheries statistical program - This project was undertaken to design and establish a fisheries statistics system that, in addition to assisting the local industry, would also provide the statistical needs of the National Marine Fisheries Service and other interested agencies. Statistical landings included number and types of fishing crafts and number of fishermen.

South Carolina 2-137-D | Raymond Rhodes | $17,500

Development of an expanded commercial fisheries statistics program - This project is undertaken to develop an improved commercial fisheries statistical program through expanded data collection and the establishment of capabilities to process and evaluate these data. The data headquarters would be located in Charleston, S.C., and would coordinate the program with the Branch of Statistics, National Marine Fisheries Service, and the State's Division of Research and Statistical Reports.

South Dakota 4-18-D | Donald Warnick | $21,000

Commercial fishery industry survey - This project provides for the development of a continuous system for the collection of statistics for all commercial fisheries and dealers of fish products in the State.

Texas 2-49-R | Claude L. Hamilton, Jr. | Completed 1971

Commercial fishery landings statistical program - Study number 1 - The National Marine Fisheries Service now gathers and compiles data on shrimp landings, while the Texas Parks and Wildlife Department gathers and tabulates statistical landings on fish, crabs, and oysters. The Department's statistical system from the coastal areas was upgraded so that landing data could be used to interpret research findings and to evaluate management programs.

Texas 2-146-D | Claude L. Hamilton, Jr. | $23,450

Commercial fishery landings statistical program - Study number 2 - This project is the second phase of the State's fisheries program to gather, compile, publish, and make available fishery statistics for fish, crab, and oyster landings from the coastal area.

Washington 1-71-R | A. Millikan | $14,000

Mid-water trawl fishery data analysis - This project will analyze catch-effort and biological data collected in the 1969-1970 hake fishery in Puget Sound, publish results of analysis of data collected 1965-69 on the fishery, and analyze accoustical hake census collected 1969-70.

Wisconsin 3-133-R Willie Fernholz $7,200

Status of fish populations in Pool 7 of the Mississippi River and probable effects of commercial gill net fishery - The purpose is to determine year-class strength of fish species encountered in the Pool 7 gill net catch and relate these data to conditions prior to the closure of the fishery in 1964 as basis for management of the fishery.

TECHNOLOGY

Thirty projects have been approved and funded under this section of the Federal Aid Program, of which 20 are completed and 10 continuing.

Maine 3-17-R Robert L. Dow Completed 1967

Study of the economic and operational feasibility of mechanization of the Maine sardine processing and canning operations - This project developed more efficient and lower cost methods of processing and canning Maine sardines

Maine 3-18-R Robert L. Dow Completed 1966

Investigation of physical aspects of raw herring - Raw herring, when taken from the nets and landed at the dock, were examined to determine the quality of the resultant canned product as sardines. Factors considered were length and weight of fish used in the investigation, food habits, thickness of belly wall, fat content, and quality of canned product.

Maine 3-94-D Richard E. Reed Completed 1969

Testing and adapting existing sardine processing equipment - This project was designed to test processing equipment. Demonstrations were made to aid in the training of employees of canners interested in such equipment.

Maryland 3-81-D Mahlan C. Tatro Completed 1969

Pasteurization of crabmeat through the use of radio frequency waves - This project was undertaken at the University of Maryland to develop technical controls needed in the commercial operation of rapid pasteurization of crabmeat and other seafoods.

Maryland 3-86-D Frederick W. Wheaton Completed 1970

Oyster-shucking study - In view of the need for automation in the oyster industry, this study investigated the application of engineering principles to this industry. The Agricultural Engineering Department of the University of Maryland studied ways to improve oyster-shucking methods and equipment, and also improve the productivity of labor.

Maryland 3-129-D F.W. Wheaton $40,726

Oyster-processing study - This study is to refine the engineering analysis of oyster processing, handling, and harvesting and to conduct theoretical and laboratory investigations of techniques to enhance labor productivity in harvesting, handling, processing, and transporting systems. To investigate new techniques and equipment modules related thereto that enhance overall aspects of oyster production is another goal.

Massachusetts 3-35-R Robert E. Levin Completed 1970

Marine food science and technology research on sanitation and handling for purpose of improving product quality and shelf-life of Massachusetts commercial fishery products - The Department of Food Science and Technology of the University of Massachusetts surveyed the bacteriological and sanitary aspects of handling facilities and practices that affect the quality of fish offshore and inshore. The purpose was to establish criteria for the proper handling of seafood products from the producer to the consumer. Technical information was disseminated through leaflets and newsletter.

Mississippi 2-61-R David W. Cook Completed 1970

A study of bacterial spoilage patterns in iced Penaeus shrimp - The primary objective of this project was to study the pattern of growth of various bacteria that contribute to the spoilage of Penaeus shrimp stored in crushed ice. Comparisons were made of the development of bacteria in aseptically handled and commercially handled shrimp. Bacteriological changes were compared with the organoleptic quality of the shrimp and the production of trimethylamine in the shrimp. Gulf Coast Research Laboratory, Ocean Springs, did this work.

Missouri 4-34-D Ruth E. Baldwin Completed 1969

Palatability of Missouri fish - A trained panel tested cubed, cooked fish fillets to determine the acceptability of different species of fish.

North Carolina 2-8-R Neil B. Webb Completed 1968

A study of the quality of North Carolina scallops - As a result of scientific studies, the industry has been given recommendations for handling scallops from the time they are harvested through the various handling and processing stages, to the final packaging. Following these recommendations will ensure a top-quality product.

North Carolina 2-76-R Neil B. Webb Completed 1969

Studies on the effects of processing on the quality of seafood products - This study, undertaken at North Carolina State University, was designed to determine how mechanical processing affects the quality of seafood products. Experiments were made to discover the optimum temperatures for opening the shell by heat shock, for separating the meat and viscera, and for final rinsing and storage of the meats. An evaluation of the finished product quality in relation to standards established for hand-shucked and processed scallop meats was also made.

North Carolina 2-95-R Murray Wolff $45,000

Scrap fish studies - The objective of this project is to investigate the effects of commercially harvesting the young of important foodfish species on the future availability of adults of the same species.

North Carolina 2-100-R Neil B. Webb $16,700

The investigation of methods for improving and evaluating the quality of seafood products - The objectives of this project are to develop methods of utilizing by-products, as well as the sea products themselves, from the processing industry through temperature control systems, development of improved sanitation, and quality control.

Ohio 4-26-R Howard S. Teague Completed 1969

Value of whole fish meal in breeding-gestation rations for swine - This project was carried out at the Robinson Swine Research Center, Ohio Agricultural Research and Development Center, Wooster. Whole fish meals was fed to sexually mature Duroc gilts to determine the level and length of feeding period required to obtain measurable effects on the reproductive function of swine. Both the fish meal and complete ration were analyzed for protein, fat, fiber, nitrogen-free extract, amino acid, trace minerals, and vitamin content.

Ohio 4-65-R Howard S. Teague $25,000

Effect of whole fish meal on reproductive performance of swine - The objectives of this project are to determine the effect of two different dietary levels of whole fish meal on the reproductive efficiency of swine as assessed by number, weight, and vigor of baby pigs born, and livability and weight gains of the baby pigs to weaning age. Additionally, the effect of the dietary treatments on certain blood constituents which may have an effect on the animals reproductive ability are investigated.

Oregon 1-10-D David L. Crawford Completed 1970

Development of the shad industry - Oregon State University Seafoods Laboratory at Astoria developed new products using American shad and ground fish. Shad and striped bass have been used to make an acceptable smoked pepperoni product. The shelf-life of this appetizing fish product was evaluated. A frozen brown-and-serve fish sausage with a fresh pork sausage seasoning has been formulated. Development of a fish loaf of the luncheon meat type was considered.

Oregon 1-12-R Duncan K. Law Completed 1970

Utilization of hake, dogfish, and by-products of the fillet industry for protein supplements - The State of Oregon has a large quantity of hake and dogfish, both sources of animal protein, and, in addition, the bottomfish industry provides fillet scrap that amounts to over 60 percent of trawl fish landed. Oregon State University, Corvallis, and their seafood laboratory at Astoria, experimented with these fish to develop stable protein products and to determine possible uses of such products. An 8-week broiler production feeding trial combining herring and hake to improve body weight and decrease food consumption was completed. Preparations to evaluate hake meals as a source of protein for trout were investigated.

Oregon 1-15-R J.E. Oldfield Completed 1968

Processed hake in feed for mink - This study was made to determine if Pacific hake could serve as the source of protein in mink ration.

Oregon 1-25-R David L. Crawford Completed 1970

Utilization of hake for human food - The purpose of this study was to investigate the use of hake as a high-quality food for human use, with emphasis on the autoxidation of the oil of hake and means of rancidity control in fresh, frozen products.

Oregon 1-34-R James E. Langler Completed 1970

Preparation of marine protein concentrate from hake - Studies at Oregon State University Seafood Laboratory, Astoria, using drum drying to make fish protein concentrate indicate that oil will separate from hake during the drying process. Experiments were made to evaluate the use of antioxidants and their effect in preventing deterioration, oxidation, or extractability of lipds.

Oregon 1-58-D David L. Crawford $12,000

Development of new human food products from shad - Conventional methods of processing and preparing fishery products, such as canning, salting, pickling, and smoking, that are compatible with shad flesh are investigated. The use of commercial shad flesh derived from deboning machine will be investigated also.

Oregon 1-59-D David L. Crawford $16,000

Utilization of hake for human food - Hake for food for human use is investigated, with emphasis on the autoxidation of the oil and means of controlling rancidity and texture changes in fresh and froxen products.

Oregon 1-63-R David L. Crawford $10,250

Discoloration in fresh and frozen crab meat - To improve methods and techniques in the handling and storage of dungeness crab and crabmeat and of maintaining the natural color and quality of canned crabmeat.

Oregon 1-64-R David L. Crawford $18,000

Preparation of fish protein concentrate - Methods and procedures for the preparation of low-fat fish protein concentrate from machine deboned and skinned, round and eviscerated hake are investigated.

Oregon 1-69-R David L. Crawford $14,000

Preparation of fish protein hydolysates - To develop and improve methods for preparing protein hydrolysates from fish fillet scrap and waste fish including hake and dogfish.

Puerto Rico 2-104-R Harold S. Olcott $10,000

Investigation of green tuna meat - The main objectives are to conduct research which will lead to the development of techniques by which the "green" fish condition can be predetermined, the cause and prevention, if possible, of this condition, and its control and/or neutralization--specifically, research on "freeze-enhanced oxidation of tuna pigments."

South Dakota 4-21-D Kenneth Schneider Completed 1968

Missouri reservoir fisheries product development and evaluation - Research was performed to determine the chemical and physical factors that affect the use of carp for food.

Tennessee 4-31-D M.R. Johnston Completed 1968

Evaluation of whole fish meal as a protein supplement for swine - The University of Tennessee Agricultural Experiment Station, Knoxville, has done research on the value of whole fish meal as a protein supplement to swine at 40 pounds live weight and carried to an average pen weight of 200 pounds.

Tennessee 4-40-D Grayce E. Goertz Completed 1970

Formula development and acceptability evaluation of selected seafood entrees - The purpose of this project was to test the nutritional value of canned and frozen seafood products. The Department of Food Science and Institute Management, University of Tenneseee, evaluated the acceptability of the seafood in Knoxville elementary schools and other areas of the State.

Washington 1-41-R Lawrence R. Berg Completed 1969

Determination of the nutritive value of North Pacific fish meals for poultry - Fish meals were recognized as excellent sources of protein, amino acids, vitamins, minerals, and energy for inclusion in rations of various types of poultry. This study was undertaken to evaluate meals from North Pacific fish, such as anchovy, dogfish, and hake, which will be used in the formulation of feeds for chickens, turkeys, and other egg-laying birds. Also, the relative nutritive work of such fish meals such as herring meal was considered.

RESOURCE DISASTER PROJECTS

Under Section 4(b) of the Commercial Fisheries Research and Development Act, as amended, $1,600,000 has been made available to the States to alleviate resource disasters from causes such as hurricanes and fish diseases. Nineteen projects have been completed. Of the disaster funds, $386,856 has been obligated for resource disaster involving diseases in blue crab and oyster, $613,144 for restoration of oyster resources from hurricane damage, and $600,000 for the New England haddock fishery disasters.

Alabama 2-64-D — Johnie H. Crance — Completed 1969

Restoration of Alabama's supply of seed oysters - To restore and establish a new source of seed oysters for Mobile Bay, about 125 acres of selected bottom in Mississippi Sound were planted with 500,000 cubic feet of shell. The areas selected are least affected by the hazards of seed production.

Alabama 2-102-D — Johnie H. Crance — Completed 1970

Restoration of Alabama's public oyster reefs damaged by Hurricane Camille - To help restore losses caused by Hurricane Camille in August 1969, approximately 40,000 barrels of oyster shells for cultch were planted on public oyster grounds on the Cedar Point Oyster Reef, Mobile County, Alabama.

Connecticut 3-51-D — Ernest Bontya — Completed 1967

Disaster relief - Fifteen spawning beds in selected locations of Long Island Sound were cleaned, protected with predator control materials, and planted with 400 bushels of brood stock oysters to evaluate the set obtained. The first spawning should provide seed oysters and brood stock for several years.

Delaware 3-49-R	Kent Price	Transferred to 4(a) funding
Maryland 3-20-R	Victor Sprague	Transferred to 4(a) funding
New Jersey 3-3-R	Harold Haskin	Transferred to 4(a) funding
Virginia 3-6-R	Jay Andrews	Transferred to 4(a) funding

Disease resistant oysters program - Potentially disease resistant oysters were planted in infested areas in an attempt to develop disease resistant stocks while at the same time disease agents and their relation to the oyster hosts were studied.

Florida 2-81-R	Sean Bollar	
Georgia 2-82-R	Robert Mahood	Completed 1970
North Carolina 2-80-R	John R. Davis	
South Carolina 2-79-R	G. Robert Lunz	

Cooperative blue crab study - South Atlantic States - A cooperative research study was conducted in each State to obtain data on hydrology, occurrence of disease and parasites, and levels of pestidides in their waters. An evaluation of the relationship to these items and abundance of blue crab was made.

Louisiana 2-27-D — Max Summers — Completed 1966

Rehabilitation and restoration of oyster seed ground - To rehabilitate the oyster seed grounds damaged by Hurricane Betsy, 630,000 bushels of clam and/or reef shell were planted in selected areas in Bay Boudreaux and Black Bay.

Maryland 3-91-R	Robert Lippson	Completed 1969
Virginia 3-91-R	W.A. Van Engel	

Blue crab study in Chesapeake Bay - This study by Maryland and Virginia developed a long-term program of study on environmental and biological factors influencing the abundance and distribution of the blue crab.

Fig. 5 - Resource disaster funds used for planting shells in Louisiana coastal area to help rehabilitate seed oyster grounds damaged or destroyed by Hurricane Camille. Photo courtesy Louisiana Wild Life and Fisheries Commission.

Louisiana 2-101-D — Ted B. Ford — Completed 1970

Rehabilitation of natural oyster seed grounds destroyed or damaged by Hurricane Camille - Approximately 60,000 cubic yards of clam shell were planted on selected areas consisting of about 2,400 acres of oyster bottoms within the natural seed grounds east of the Mississippi River to replenish and supplement cultch materials to areas damaged or covered with foreign materials by Hurricane Camille in August 1961

Massachusetts 3-107-R — Charles E. Martin — Completed 1970

Disaster relief--Massachusetts haddock fishery - Project objective is to conserve and rehabilitate haddock stocks through a program of fishing gear conversion and diversification of fishing effort.

Michigan 4-63-D — Raymond D. Schofield — Completed 1970

Whirling disease control - The objectives of this project was to determine the incidence of whirling disease and control needs and to carry out control operation in an attempt to eradicate the disease in Michigan inland waters.

Mississippi 2-103-D — William J. Demoran — Completed 1970

Rehabilitation and restoration of oyster ground damaged by the hurricane of August 1969 - To replenish cultch material on oyster grounds damaged by Hurricane Camille in August 1969, approximately 50,000 cubic yards of clam shell were planted on about 3,000 acres of natural oyster bottoms in the western portion of Mississippi Sound and Heron Bay.

Texas 2-65-D — Robert Hofstetter — Completed 1969

Oyster rehabilitation in San Antonio Bay - To increase oyster spat setting as a means of repopulating public reefs damaged by Hurricane Beulah, in 1968, about 15,000 bushels of oyster brood stock were dredged from Galveston Bay and transplanted on depleted reef sites in San Antonio Bay.

PUBLICATIONS

In carrying out project activities about 300 State scientists are continuously employed to work on fishery problems which have resulted in 249 publications. Of these publications 205 have appeared in scientific journals and 44 have been for partial fulfillment of the requirements for college degrees. Following are the literature citations for the publications with associated project number given in parentheses.

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Maryland	Fish & Wildlife Administration	State Office Building Annapolis 21404
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	Pacific Salmon Inter-agency Council	741 State Office Building Portland 97201
	Oregon State University	Corvallis 97331
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Texas	Parks & Wildlife Department	John H. Reagan Building Austin 78701
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